RAILROAD GAZETTE

FRIDAY, APRIL 20, 1900.

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Contributions.

Oiled Ballast.

The Pennsylvania Railroad Company,
New York, April 16, 1900.

To the Editor of the Railroad Gazette:

In your issue of March 23, in your report of the proceedings of the American Railway Engineering and Maintenance of Way Association, you make it appear that I verified the statement that with the use of oil, all parts of the cars were covered with a coating of oil and grit, and that I further stated that "Where the roadbed has been sprinkled, passengers have complained so much of clothes being ruined by the greasy deposit in the cars that the practice of using oil on the roadbed, especially between Philadelphia and Atlantic City, has been abandoned, and rock ballast is being put down."

Inasmuch as your paper is renowned for its accuracy, I will request you to correct the above statement. The official proceedings will show that I did not say anything of the kind. I do not care to be misquoted, or to appear to condemn a device which can be used to great advantage in certain parts of the country.

S. P. HUTCHINSON,
Assistant General Agent.

Compensation for Carrying Mails.

Southern Pacific Company,
San Francisco, Cal, March 31, 1900.

To the Editor of the Railroad Gazette:

In your issue of March 16 you give, under the head of "Cost of Carrying Mails," certain tabulated matter purporting to have been copied from a report by Professor Henry C. Adams, who was employed by the Joint Congressional Commission to investigate the cost of carrying mails by the railroads. We do not know, of course, to what extent Professor Adams is responsible for the data, which your article plainly states were copied from the Chicago Tribune, but, as I enjoyed the privilege of listening to Professor Adams' testimony before the Commission in New York and took very full notes, I am inclined to think that certain deductions from statistics attributed to him are misleading.

The data quoted by you show a decline in freight rates since 1878 of 35 per cent., in passenger rates of 17.5 per cent., and a decline in mail rates of nothing. The average freight rate in 1878 and at the present time was, of course, determined by dividing the ton-mileage of freight carried into the freight earnings. Performing the same division in the case of mail traffic, we get the following: Ton-miles of mail hauled in 1878, 39,755,061; rate per ton-mile, including postal car compensation, 23.167 cents. Ton-miles of mail handled in 1898, 272,714,017; rate per ton-mile, including postal car compensation, 12.567 cents. These figures, which Professor Adams gave in New York, show a reduction in the average rate per ton-mile for carrying the mails of 46 per cent., or more than is shown in passenger or freight traffic. It is true the law governing mail pay has not changed, but it prescribes rates that decrease rapidly with increase of weight hauled.

It is not clear what is meant by the fixed rate for haul of 300,000 pounds of mail, average distance, a mile, which is given as $7,317. The rate prescribed by law for the haul of this weight of mail per annum an average distance of one mile is $3,323.28 (page 124, testimony Second Assistant Postmaster-General before the Sub-committee of the Committee on Appropriations, United States Senate), or rather less than one-half the amount quoted.

On the occasion above referred to, when the writer was called to testify before the Commission, he endeavored to point out the unfairness of comparing the ton-mileage rates for hauling mails, passengers and freight, without qualifying the conditions under which the services were performed. The amount of dead weight that has to be hauled by the railroads to earn compensation for the haul of a ton of mail, passengers or freight, vitally affects the profit in the service. A very high ton-mile rate may be unremunerative if the amount of work performed is out of proportion to the compensation received. On the other hand, a very small rate may be quite profitable under other conditions.

The rates given below are quoted from Professor Adams' figures for 1898, submitted to the Commission in New York:

	Cents.
Rate per ton-mile for carrying the mails	12.567
Rate per passenger per mile	1.973
Rate per ton-mile of freight	0.753

For every ton of mail for which the railroads receive pay, they are obliged to haul in weight of cars and furniture and equipment of post-offices on wheels, 19 tons of dead or non-paying load, or, when they receive 12.567 cents for hauling a ton-mile of mail, 20 gross tons of weight are hauled one mile, the rate per gross ton-mile being thereby reduced to 0.63 cent. When hauling passengers, 29 tons of dead load are hauled for every ton of passengers; assuming 10 passengers to the ton, would make the rate per ton-mile for passengers 19.73 cents, for which the railroad is required to haul 20 gross tons of load one mile, yielding an average rate per gross ton-mile of 0.66 cent. For every ton of freight hauled, 1.3 tons of dead load is hauled, or, for 0.753 cent, 2.3 tons of load must be hauled one mile, yielding an average rate per gross ton-mile of 0.33 cent.

The railroads, therefore, receive less for mail than for passenger traffic, and, in both these classes of traffic by passenger train, they receive about twice the rate per gross ton-mile received for conducting business on slower freight trains. This is certainly no great disproportion when it is considered that, in hauling mail and passenger traffic, the business is conducted with such attention to punctuality, speed and the highest possible grade of service as to be regardless of expense; on the other hand, in freight service every known economy in the way of heavy car and train loading is practiced.

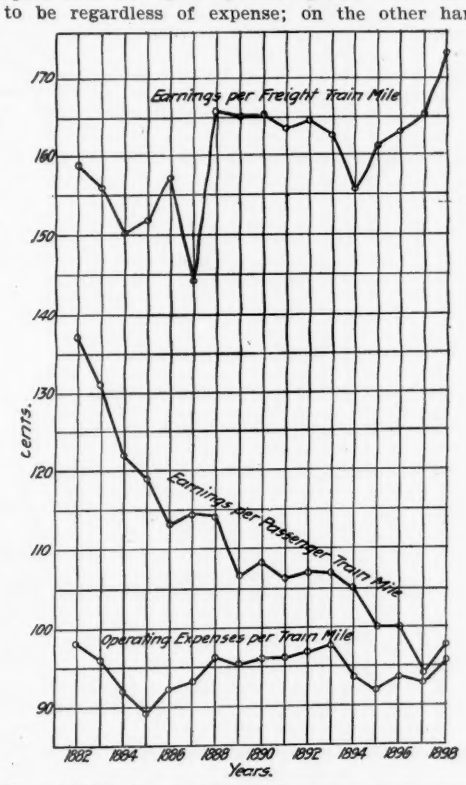


Fig. 3 (Exhibit J).—Freight and Passenger Earnings Per Train Mile.

For the years 1888 to 1898 the statistics are taken from the Interstate Commerce Commission report. Previous to 1888 the authority is Poor's Manual for freight earnings and operating expenses. The only authority giving total passenger train earnings for the earlier years is the census of 1890, from which the earnings here shown have been computed.

Other data from your article are:

Percentage of mail to gross railroad earnings, 1878	1.879
Percentage of mail to gross railroad earnings, 1898	2.747

Unless the percentages of increase in mail and other traffic are considered, these figures are certainly misleading. Prior to 1880 no official figures are available, so far as we know, for either freight or passenger traffic. If we consider the data for 1880, any conclusions based on them would be less favorable than if the figures for 1878 had been used, as the business of the railroads shows a uniform and steady increase from the first available statistics. In 1880 the ton-mileage of mails, according to Professor Adams' testimony, was 47,111,138; in 1898, 272,714,017, an increase of 479 per cent. The ton-mileage of freight in 1880, according to the United States Census, was 32,348,846,693; in 1898, according to the Interstate Commerce Commission reports, 114,077,576,305, an increase of 253 per cent. The passengers carried one mile in 1880, as shown by the census, 5,740,112,502; in 1898, by the Interstate Commerce reports, 13,379,930,004, an increase of 133 per cent. Inasmuch as the mail traffic of railroads has increased nearly twice as rapidly as freight and over three times as rapidly as passenger traffic, it is not unnatural that the ratio of mail to gross earnings should have slightly increased.

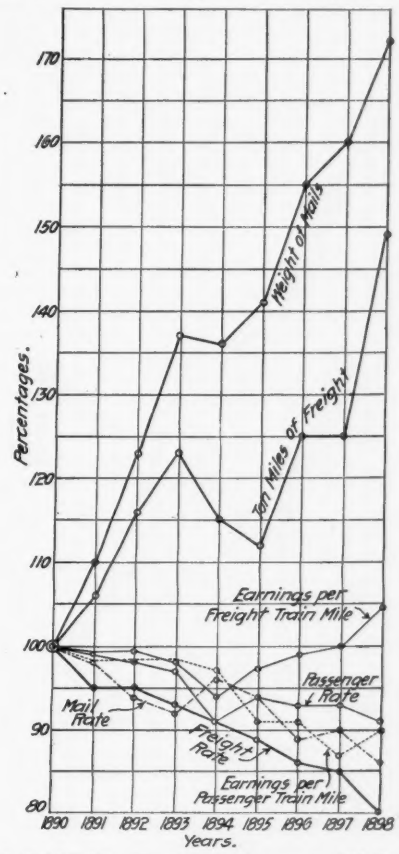


Fig 2 (Exhibit H).—Comparative Increases of Mails and of Freight, and Decreases in Rates.

In this diagram the quantities and rates in force in 1890 are taken as 100 per cent. and the situation in each of the successive years is shown in percentages of the traffic (or the rate) in 1890. The weight of mails as shown here is taken from the testimony of Madison Davis, page 666. The compensation paid for mail is computed from the report of the Post Office Department, 1898, page 594. Freight and passenger statistics are taken from the Interstate Commerce Commission report.

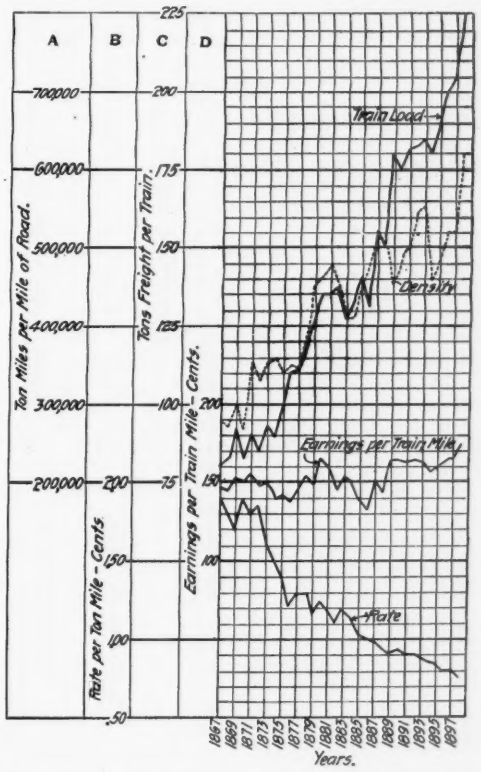


Fig. 4 (Exhibit K).—Volume of Freight and Freight Earnings in the United States; 1867 to 1898, Inclusive.

These data have been taken from the Interstate Commerce Commission's reports and from Bulletin No. 15 of the Department of Agriculture, 1898.

The statement that gross passenger revenues would be in 1898, on the mail basis of pay, $80,000,000,000, as against $267,000,000 actually, is not entirely clear. The rate per passenger per mile given by Professor Adams in New York was 1.973 cents. Assuming 10 passengers to the ton, would be 19.73 cents per ton-mile, and at this rate the revenue actually enjoyed by the railroads was $267,000,000. As the mail rate per ton-mile was but 12.567 cents, if passengers had been carried at the same rate, the revenue derived would have been but $170,000,000, and not $80,000,000,000, as claimed.

As a matter of public interest, four charts are appended, prepared some months ago. The one marked exhibit "G" shows the automatic reduction in rates of railway mail pay per ton-mile with increase of weight.

Exhibit "H" shows, from only data then available, the relative increases in tonnage of freight and mails, and relative decreases in passenger, freight and mail rates, from 1890 to 1898, both inclusive, together with the earnings per passenger train-mile and the earnings per freight train-mile. It will be noted that the earnings per freight train-mile have steadily increased in the past few years with increased density of traffic, while the earnings per passenger train-mile, of which both passenger and mail rates are factors, have steadily fallen, although the mail traffic has increased much more rapidly than freight traffic. In the case of passenger service, considerations of public utility, more rapid and more frequent service, instead of considerations of economy, have been paramount.

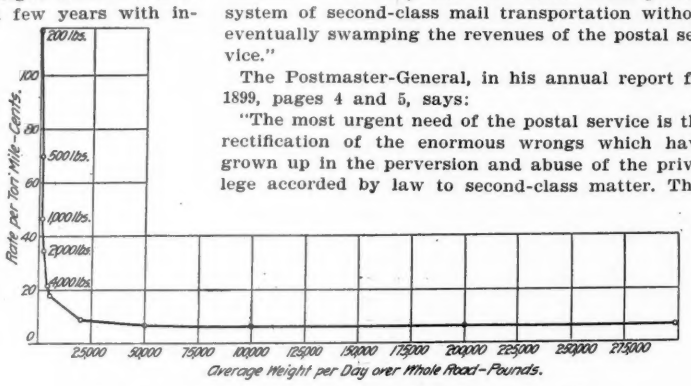


Fig 1 (Exhibit G) —Rates of Railroad Mail Pay Per Ton Mile.

Showing the rapid decrease in the rate when the quantity is above two tons a day.

Statement "J" shows by the length of ordinate intercepted between the curves, that the net earnings per freight train-mile are increasing, while the net earnings per passenger train-mile have been steadily decreasing, and in 1897 and 1898 were practically all absorbed in operating expenses, without taking account of taxes and fixed charges.

Exhibit "K" shows how, with uniformly falling freight rates, the earnings per train-mile have increased through operating economies. In mail traffic economy is ignored and the convenience of the post-office department, speed and punctuality govern.

A rough check of the aggregate train service rendered by the railroads of the United States to the Post-Office Department is afforded by checking up the mileage of full R. P. O. cars and the mileage of apartment cars reduced to equivalent R. P. O. cars. The Post-Office Department report for 1899, page 626, shows the mileage of crews, and therefore the mileage of cars, in full R. P. O. car lines, 80,369,803; in apartment cars, 108,920,132. Estimating the apartments at but 40% of the length of the full car reduces the latter figure to 43,568,053 as equivalent mileage of full R. P. O. cars; adding this to the 80,369,803 above, gives the equivalent mileage of full postal cars 123,937,856. An examination of the annual reports of a number of large systems shows the average passenger train to consist of about five cars. For the United States, it would probably be less than this, as trains are smaller on short lines, but data as to their operations were not available. At the liberal estimate of five cars to the train, the above car mileage represents a passenger train-mileage of 24,787,571. The average cost per train-mile, including taxes and fixed charges, as computed from the Interstate Commerce Commission report for 1898, would be $1.40, or $34,702,599 for the entire United States, or some five hundred thousand dollars more than was received for the entire postal service performed by all roads in the United States. This takes no account of the cost of service rendered by the railroads in delivering mails at terminal and way stations, or of the very considerable tonnage of mail carried in closed pouches in baggage and express cars.

The Post-Office Department of the Government, representing the people, has never clamored for a general reduction in the pay of the railroads, as they are familiar with the causes of postal deficits, and have frequently pointed out the patent and equitable remedy. The Postmaster-General, in his annual report of 1897, pages 6 and 7, says:

"The injustice inflicted both upon the postal revenues and the people by existing laws regulating the carrying of second-class mail matter has been represented to Congress in reports from this Department for ten years past with cumulative force, but without effect in remedial legislation.

"By acts of Congress passed in 1874, 1879, 1885 and 1894, a privileged class has been created, entitled to the use of the United States mail service either free of charge or at a cost far below the price the Government is compelled to pay the railroad companies. It is bestowed upon persons engaged in private enterprises, and inures simply to their emolument, without any appreciable benefit to the public at large, while the loss on this service, now amounting to more than $26,000,000 a year, is defrayed out of the proceeds of taxation drawn from all classes of the people. . . .

"The weight of mail matter carried under provisions of the law, originally intended to confer a public benefit, but since perverted to purposes of wrong and injustice, is increasing in ominous proportions. Its growth, stated in round figures, has been as follows: 1888, 143,000,000; 1889, 190,000,000; 1890, 205,000,000; 1891, 232,000,000; 1892, 262,000,000; 1893, 301,000,000; 1894, 300,000,000; 1895, 312,000,000, 1896, 349,000,000; 1897, 365,000,000 pounds.

"The cost to the Government of transmitting the 365,000,000 pounds of second-class mail matter carried during the past fiscal year is estimated at $29,000,000; the postal revenue received from it is estimated at $3,000,000, leaving a loss, on transportation alone, of $26,000,000. These figures convey their own comment. It is impossible to continue the present system of second-class mail transportation without eventually swamping the revenues of the postal service."

The Postmaster-General, in his annual report for 1899, pages 4 and 5, says:

"The most urgent need of the postal service is the rectification of the enormous wrongs which have grown up in the perversion and abuse of the privilege accorded by law to second-class matter. This reform is paramount to all others. For this costly abuse, which drags on the Department and weighs down the service, trammels its power and means of effective advancement in every direction. It involves a sheer wanton waste of $20,000,000 or upward a year."

J. KRUTTSCHNITT,
General Manager.

The Memorial Bridge at Washington.

The competitive designs for the great memorial bridge at Washington, D. C., have been duly considered by the Board and the award made. It probably will be well to refresh the memory of the reader by saying that the engineers who were asked to bid were Messrs. L. L. Buck, W. H. Burr, W. R. Hutton and G. S. Morison. Under the terms of the competition the design first in order of merit was to receive $1,200, the second $1,100, and the third $1,000 and the fourth $900. Considering the magnitude of the work these sums cannot, we should suppose, pay for the cost of preparing the drawings and estimates. The Board which passed upon the competitive designs consists of Lieut.-Col. Charles J. Allen, Major Thomas W. Symonds and Capt. D. du B. Gaillard, Corps of Engineers, U. S. A., Mr. Stanford White of New York and Mr. James G. Hill of Washington.

The design accepted is by Prof. Burr. A synopsis of the several designs as submitted is given in the table herewith and the Board accepted Prof. Burr's design No. 2, rejecting, however, the towers submitted with that design and accepting the towers of his design No. 1. From the inadequate pictures which we have seen of the two designs we are disposed to think that the committee made a mistake in architectural judgment, but, as we said, the pictures that have been published do not permit a definite opinion to be expressed on this matter.

The designs were classified as follows in order of merit: No. 1, Prof. Burr's design No. 2; No. 2, Mr. W. R. Hutton's design No. 2; No. 3, Mr. L. L. Buck's design No. 1; No. 4, Mr. G. S. Morison's design No. 1.

The accepted design may be briefly described as follows: It is for a single deck bridge, 60 ft. between railings, with two 10-ft. sidewalks and a 40-ft. roadway, with no provision for street railroad. The length of the bridge proper and approaches is about 3,400 ft. The bridge proper consists of six 192-ft. masonry arches, having between them a 159-ft. steel draw-span. These masonry arches are circular, the springing line 24 ft. above mean low water, the rise 29 ft. above the spring and the radius of intrados 173.8 ft. The face of the arch ring is of granite, but the main part of the arch is Melan with five steel ribs. The granite arch ring is 5 ft. 6 in. deep at the crown and 9 ft. 6 in. at the spring. The steel ribs are 30 in. at the crown and 7 ft. 3 in. at the spring. A solid masonry spandrel wall partly of granite and partly of concrete rests on the arch and the weight of the floor is carried to the arch ring by framed steel posts. The draw span has two bascule arms on trunnions balanced by backward extensions and counter-weights. The span from center to center of trunnions is 172 ft. These bascules are made up of five steel, lattice-girder trusses with parallel chords.

The Washington approach has twelve 60-ft. masonry arches and beyond them 550 ft. of earth bank. The Arlington approach has fifteen 60-ft. masonry arches and 1,350 ft. of earth bank. Massive towers flank the drawspan and these towers are connected in pairs by arches thrown transversely over the width of the bridge, making a dignified and beautiful architectural monument.

The Board explains in some detail the reasons for the great differences in the estimated cost. The low cost of Mr. Morison's estimate is largely due to the steel construction for the approaches, the absence of massive towers and decorative features and the use of limestone in the arches. Mr. Burr's low figures are due to Melan construction, the ingenious use of steel and the greater length of earth bank. Mr. Hutton's estimates are accounted for by the materials used and the decorative features. Mr. Buck's high estimates are largely due to the amount and character of decorative work and to the very free use of granite masonry. We happen to know that Mr. Buck held strongly to the theory that the underlying idea in this bridge should be one of great dignity and stability and that in building a monument of this character cost should not be allowed to control at a sacrifice of dignity and beauty.

The Washington Memorial Bridge.

Name.	Design No.	Width, feet.	Bridge proper, except steel draw.	Approaches.	Cost.
Mr. Buck.....	I.	80	Steel and 6-cut masonry.	Six-cut masonry.	$16,434,230
Mr. Buck.....	II.	60	Steel and 6-cut masonry.	Six-cut masonry.	14,735,400
Mr. Buck.....	I.	80	Steel and rock-face masonry.	Rock-face masonry.	15,409,000
Mr. Buck.....	II.	60	Steel and rock-face masonry.	Rock-face masonry.	13,940,000
Mr. Burr.....	I.	60	Steel.	Melan.	4,083,850
Mr. Burr.....	II.	60	Melan.	Melan.	3,680,672
Mr. Burr.....	III.	60	Melan.	Melan.	4,480,224
Mr. Hutton.....	I.	60	Steel.	Masonry and steel.	9,954,510
Mr. Hutton.....	II.	60	Steel.	Masonry and steel.	5,750,000
Mr. Morison.....	I.	80	Masonry.	Steel.	2,757,264
Mr. Morison.....	II.	60	Masonry.	Steel.	2,170,425
Mr. Morison.....	I.	80	Masonry (no draw).	Earth.	2,084,500

Cast Steel Parts of the New Chicago & Alton Eight-Wheel Locomotives.

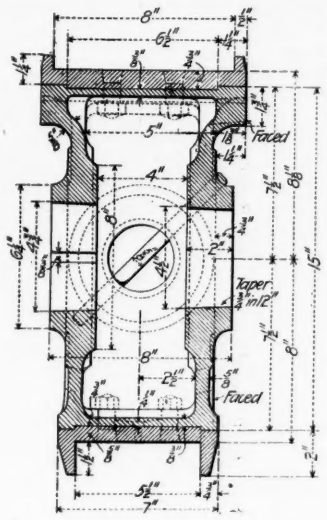
In the description of the Chicago & Alton new eight-wheel passenger engines, published January 5 last, it was stated that cast steel had been used for many parts in place of cast and wrought iron; also that particular attenion had been given to the appearance of the finished castings. Twenty-four drawings were required for these castings and the accompanying engravings show the most interesting details. The difference in weight of these and similar parts made of wrought iron or cast iron is approximately 9,000 lbs. for each engine, but there is really a larger saving in weight, as many of the cast steel parts could not be replaced by forgings or iron castings without considerable change to the adjacent parts.

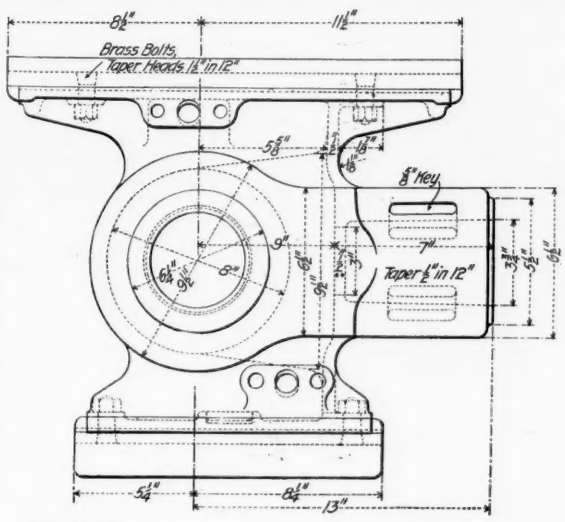
The builders of these engines, the Brooks Locomotive Works, have kindly furnished the drawings here reproduced and the following table, showing the finished weights of the steel castings used for one Chicago & Alton eight-wheeler, together with the weights of similar parts made in wrought iron or cast iron.

Steel Castings for One Chicago & Alton Eight-Wheeler.
Finished weight in pounds of cast steel parts and similar parts made of wrought or cast iron.

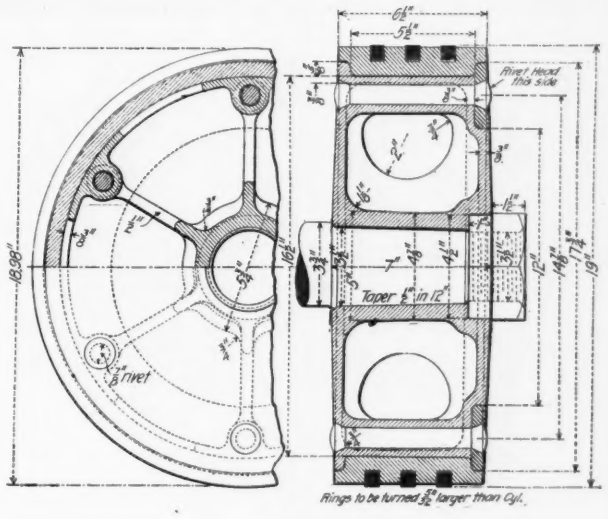
Description.	Cast steel.	Wrought iron.	Cast iron.	Difference.
Cylinder heads, front	294	...	448	154
" " back	426	...	692	266
Piston	356	...	504	148
Crossheads	362	422	...	60
Rocker shaft	190	250	...	60
" boxes	266	...	396	130
Main rod end blocks	48	69	...	12
Lift shaft arms	224	256	...	32
Driving boxes	1,032	...	2,012	980
" wheel centers	7,460	...	10,124	2,664
Frame foot plate	1,070	...	2,212	1,142
" furnace bearers	420	...	740	320
Engine truck spring hangers	84	96	...	12
" " swing beam	320	...	440	120
" " wheel centers	1,460	..	1,940	480
Driver brake fulcrum bracket	550	...	930	380
Equalizer beam	324	528	...	204
Spring rigging, equalizer fulcrum	188	...	326	138
Spring rigging, spring hanger brackets	112	...	180	68
Spring rigging, spring seats	120	208	...	88
Spring rigging, spring hangers.	160	212	...	52
Tender frame draw casting, rear	750	...	1,150	400
Tender coupler tail strap	66	97	...	31
" truck wheels	3,320	...	4,280	960

To our knowledge, this is the first time that such

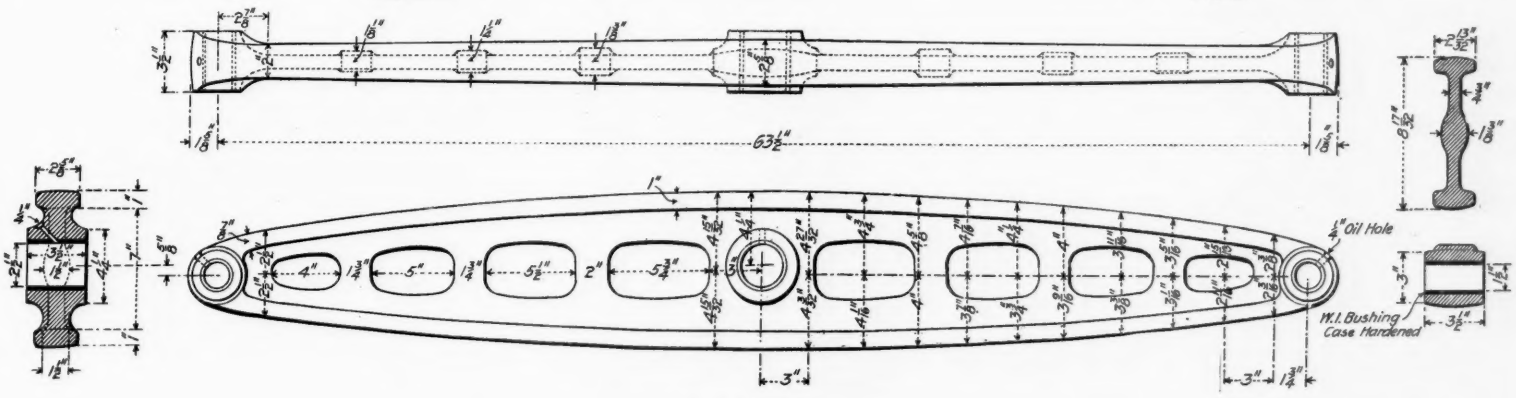




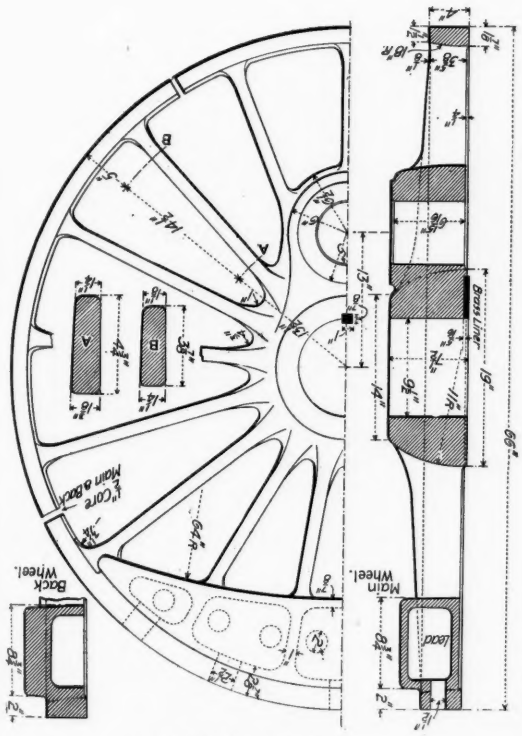
Crosshead.



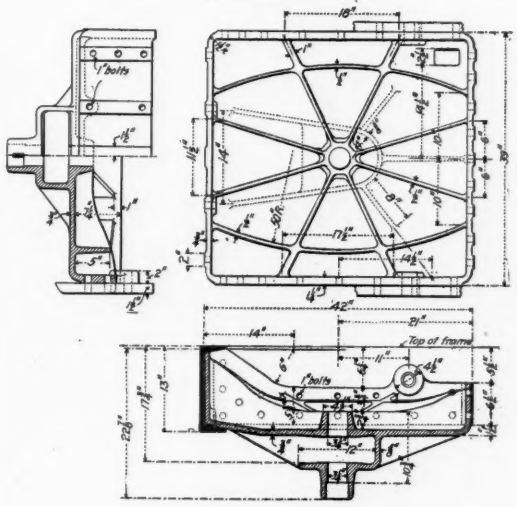
Piston.



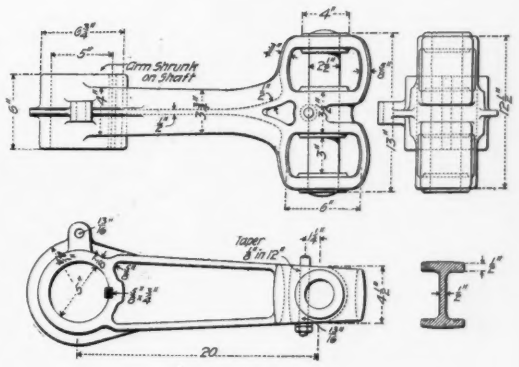
Equalizing Beam.



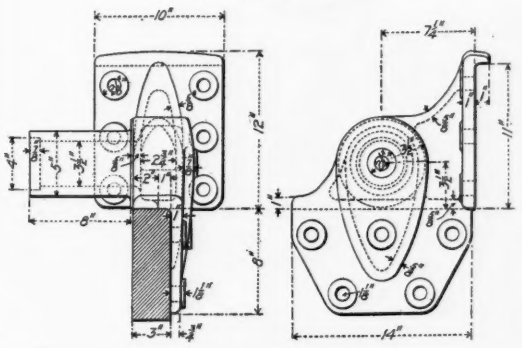
73-inch Driving Wheel, Center.

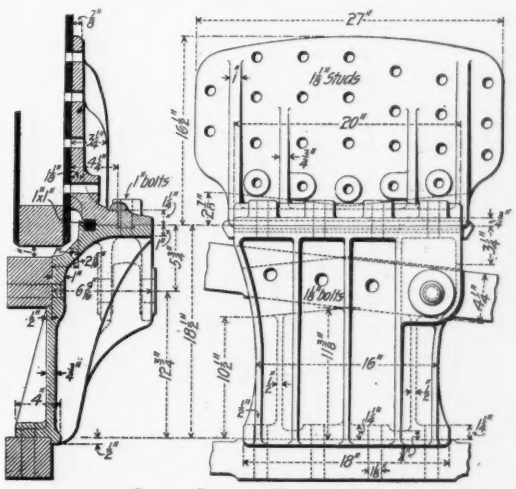


Frame Foot Plate.

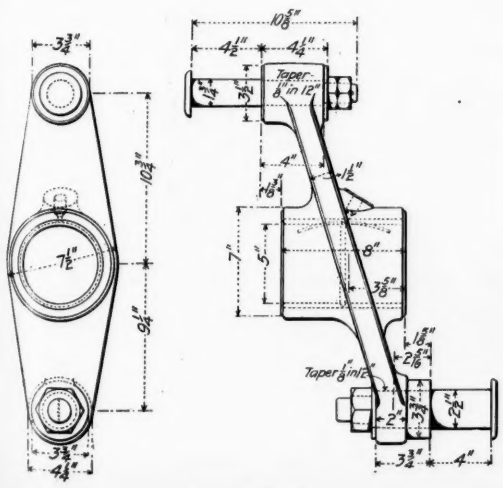


Lift Shaft Arm.

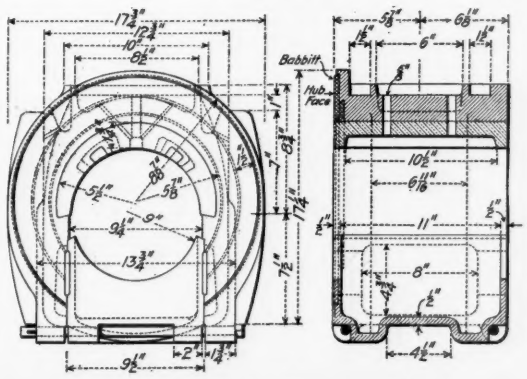




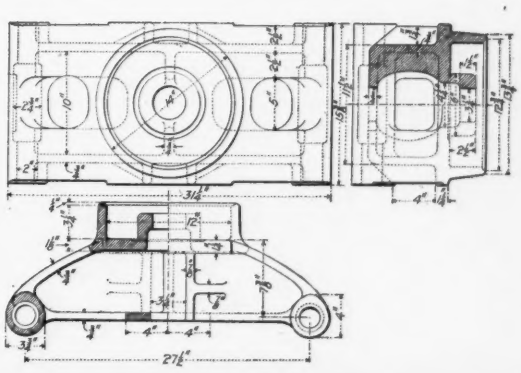
Frame Furnace Bearer, Side.



Rocker Shaft.



Driving Box.



Engine Truck Swing Beam.

STEEL CASTINGS USED ON THE CHICAGO & ALTON EIGHT-WHEEL PASSENGER LOCOMOTIVES.

information has been published, and those who have not yet considered the use of cast steel to reduce the dead weight of locomotives can profitably study this table. It will be noticed that the largest saving of weight is in driving and truck wheel centers, driving boxes and other large parts; the weight saved in the reciprocating parts enables smaller counterbalances to be used, and the spring rigging is materially improved in weight and appearance by the use of cast steel. Further, the steel castings when well designed are stronger than the heavier iron forgings or castings, and the accompanying designs may be taken as representing the best practice.

The Purdue Locomotive Paint.

Prof. W. F. M. Goss has presented to certain locomotive builders and motive power men a plan to increase the usefulness of the locomotive testing plant at Purdue University and make it available for a larger number of those interested in the building and maintenance of locomotives and locomotive appliances. During the eight years that the Purdue plant has been in operation it has become evident that more and better work could be done if there were a parmanent staff at the locomotive plant for carrying on research and commercial tests, and this force could easily be maintained with the cooperation and support of the railroads, locomotive builders, and others interested. Prof. Goss' plan for carrying on such a locomotive laboratory is set forth in the following extracts from a recent letter:

The instructional work, the research which can be paid for by the Purdue Trustees, and the commercial work, all combined, have not in the past been sufficient to warrant the maintenance of a permanent force of attendants about the locomotive plant, with the result that work which has been accomplished has been done at a disadvantage and real progress has been slow. Moreover, the limitations arising from this course have prevented the acceptance of many pieces of commercial work which, under more favorable conditions, could have been accomplished with profit.

It is the desire of the Trustees of Purdue that the locomotive testing laboratory shall be made to serve as large a sphere of usefulness as practicable. While unable themselves to provide funds for its continuous operation, they are ready to extend every encouragement to others who may assist to such an end. To sustain a permanent organization at the plant, and to provide supplies of fuel, oil, etc., needed for its continuance, will require the expenditure of from $6,000 to $8,000 a year. It would seem not unlikely that the business demands of a whole country would equal this amount, at least for a single year. It is proposed, therefore, to ask those who are likely to be interested in the subject to subscribe for work to be done at times which may be agreeable between September 1, 1900, and September 1, 1901. Thus, Messrs. X. & Co. may signify their willingness to invest in the laboratory to the extent of $1,000; Messrs. Y. & Co., to the extent of $2,000, while individuals may come in for amounts as low as $100. In the event that a sufficient amount is subscribed to warrant an organization on the basis indicated, they may at any time within the twelve months indicated arrange to have work done and reported upon by the regular laboratory authorities with the expectation of paying a fair amount for each test or each investigation, which amount will be credited against the amount they subscribed.

The purpose of the charge and the basis upon which it will be fixed will be such as to cover labor and material accounts only. Nothing will be charged for the use of the plant, or for deterioration, or for repairs except such as may result from the progress of the individual work in hand. The laboratory authorities will hold themselves in readiness to quote in advance fixed prices for all work that may be proposed. To run the plant would require one fireman, one coal passer, one oiler, one wiper, two permanent observers and a foreman, making the daily labor costs about $16; office expense in summarizing data and in formulating reports, chargeable to one day's running would be $6, and $2 allowance would be needed to cover loss arising from periods of enforced idleness, thus making a daily expense of $24. This expense would be expected to continue whether the engine was actually under steam or not. The observers and foreman at such times assisting in the office work, while the less expensive labor would be making needed preparations for the next run. To the above estimate covering fixed charges, there is to be added, for days when the engine would be under steam, an additional item of $15 to cover cost of fuel, oil and other supplies. It will be seen on the basis of the above estimate that one desiring a test of a valve, or a valve mechanism, or of an exhaust nozzle, or any small thing which could be determined in a single day's running, could secure all the information desired for something less than $100. This statement, while merely an indication of the basis upon which it is proposed to make charges for work done, is offered for the guidance of proposed subscribers.

The character of the work which may be undertaken may be anything for which the plant is adapted. It may include a determination of the value of different fuels used under conditions of locomotive service; tests of improvements in the parts of locomotives as, for example, valve gears and other portions of the mechanism, stacks, draft appliances, lubricators, etc., or it may include tests of complete locomotives. Thus, any locomotive within the capacity of the plant could be received at the laboratory, mounted, subjected to a series of careful tests, and delivered from the laboratory ready for shipment.

It is recognized that the fact that proposed patrons are asked to signify their intention some months before work can be undertaken, has a distinct disadvantage in the working out of the proposed scheme, but inasmuch as the University cannot venture money in a business operation, the condition leading to the objection is a necessary one, though in part, at least, compensated for by the tender on the part of the University of the free use of an expensive plant and the consequent low price at which it is proposed to do work.

Charles Coster and the Southern.

At a meeting of the Board of Directors of the Southern Railway Company held April 12, the following resolutions were passed, regarding the death of Mr. Charles H. Coster, late Director of the Company:

. . . The plan for the reorganization of the Richmond Terminal Companies, and for the formation of the Southern Railway Company, was chiefly the conception and the achievement of Mr. Coster as Chairman of the Reorganization Committee, and that plan was the model after which were subsequently drawn many of a long series of successful plans for the reorganization of insolvent railroad companies.

The ascertainment and analysis of the conditions, the weaknesses and the possibilities of the corporations composing the Richmond Terminal System were exhibited in that plan with a thoroughness and fullness that at first were startling, but which the event fully justified.

In the clear recognition and wise readjustment of the antagonistic elements involved in that undertaking, Mr. Coster demonstrated in a most masterly way the value of absolute justice and sincerity in the solution of business problems of great difficulty and complexity, and impressed all with whom he dealt with a deep sense of his personal fairness and fitness to adjust and to arbitrate between large interests apparently in hopeless conflict.

In the corporate life of the Southern Railway Company, Mr. Coster continuously rendered services hardly less important or less valuable than at its birth; and the development of the company into its present prosperous condition has been materially aided by his rare ability and wise counsels, and by his faithful and discriminating support of its officers and of its policy of conservatism and growth. . . .

Another Column Formula.

The March number of the Proceedings of the American Society of Civil Engineers contained a long paper by Mr. J. M. Montcrieff on "The Practical Column Under Central or Eccentric Loads," in which many important and novel points are discussed in an able and interesting way. Column formulas have been set forth in recent years in such number and variety that ordinarily but little attention would be paid to a new one; the one now presented, however, is so radically unlike those heretofore proposed and is deduced from such a different point of view that it deserves attention, especially as the paper contains a large amount of experimental evidence in its favor.

The main direction of attack in the past has been upon a column with a central load. Euler deduced the well-known formula for the central load that holds in equilibrium any deflected strut; Gordon and Rankine derived formulæ for a safe central load in terms of the compressive stress on the concave side of the column, and later numerous empirical formulas have been set up from the results of tests. The question of eccentric loads has been mainly studied for short columns only, formulas for long columns under such loads being difficult to find in text-books; or, when found, difficult of practical application.

It has long been known that the deflection of a column under a central load is indeterminate, while that under an eccentric load has a perfectly definite value. The exact formula for this deflection is easily derived, but unfortunately it is in a trigonometric form that cannot be applied in practice. Mr. Montcrieff has boldly solved this difficulty by assuming that the deflected curve is a parabola. If P be the load applied at a distance e from the center of the cross-section, l the length of the column, A the area and r the radius of gyration of the cross-section, and E the modulus of elasticity, his formula for the lateral deflection of a round-ended column is

$$d = \frac{6\,P l^2\,e}{48\,E\,Ar^2 - Pl^2}$$

which he shows to agree very well with the few experiments that have been made. If the eccentricity e becomes zero, the load is central and the deflection d should be indeterminate; this will be the case when the denominator is zero, and this condition gives an expression identical with Euler's formula except that 9.6 takes the place of π.

When a column of cross-section A carries the load P, the average compressive stress is $\frac{P}{A}$, and if to this be added the stress due to flexure, the total stress F at the middle of the concave side is

$$F = \frac{P}{A}\left(1 + \frac{c\,e}{r^2} + \frac{c\,d}{r^2}\right),$$

in which c is the distance from the axis of the column to that concave side and the other letters have the same meaning as before.

These two equations contain all the pure theory presented by Mr. Montcrieff, his additional discussions being merely reductions and transformations. The second equation is an old one, the first is a new and important one. By substituting in the second equation the value of d given by the first, he derives a formula containing five quantities, namely, the unit-load $\frac{P}{A}$, which may be designated by f, the unit-stress F, the ratio of length to radius of gyration $\frac{l}{r}$, the ratio $\frac{c\,e}{r^2}$ and the modulus E. This resulting formula for round-ended columns may be written

$$\frac{l^2}{r} = \frac{48\,E\,(F - f - fn)}{f\,(5\,F - 5\,f - fn)},$$

in which, for the sake of brevity, we have represented the ratio $\frac{c\,e}{r^2}$ by the letter n. From this formula he constructs curves having values of $\frac{l}{r}$ as abscissas and values of f as ordinates, having previously ascertained or assumed the values of E, F and n.

In order to apply this formula to the case of central loads, which is the usual one arising in practice, the author presents numerous diagrams of tests, and concludes that such central loads generally have a certain concealed eccentricity equivalent on the average to a value of 0.6 for n. Then, assuming proper values of E and F, the formulas contain only $\frac{l}{r}$ and f. For example, the formula for medium steel is

$$\frac{l^2}{r^2} = \frac{48{,}000\,(2.4 - 1.6\,f)}{(12 - 4.4\,f)f},$$

in which f is to be taken in units of 10,000 pounds; thus, if f is to actually be 5,000 pounds per square inch, then f in the formula is 0.5 and the corresponding value of $\frac{l}{r}$ is about 130.

It will be seen from the above brief explanation that Mr. Montcrieff's column formula for central loads is a complicated one which cannot be readily used in practice. All other column formulas give the value of $\frac{P}{A}$ which is represented above by f, in terms of $\frac{l}{r}$. In this case such an expression cannot be obtained except by the use of a quadratic equation, which the author prefers to avoid, and hence he leaves the formulas in essentially the shape as written above. Unless it can be shown that the formulas in common use give erroneous results, and this is not shown in the paper, there is no probability that Mr. Montcrieff's formula for columns under central loads will be received with favor. His general formula for columns under eccentric loads, however, is to be viewed in a different light; the results derived from it are practically as close as those found from the mathematically correct expression, and it is likely to be of immediate service in cases of design. It will, indeed, not be difficult to put it into another form that will be more convenient in practical use.

The author of the new column formula is an Englishman who obtained his technical education under the British system of pupilage or apprenticeship in an engineering office, and has since been engaged in the construction of docks, cranes, buildings and bridges. He was led to study the subject of columns from the necessity of designing several of exceptionally large eccentricity for which he could find no theory of easy application. The discussion of the tests of Hodgskinson, Bauschinger, Christie, and others he regards as in itself a sufficient apology for the appearance of the paper, and we are disposed to think that this is the case. Unfortunately his theoretic investigations are not always clearly presented, and there are points in the treatment of central loads which will undoubtedly be severely criticised in the discussion to be held on May 2. Nevertheless it appears that the paper, like the one of Prichard on the ideal column, is a step in advance, and that it will receive careful attention from engineers engaged in bridge and structural work.

An Oil Furnace and a Fire Kindler.

Messrs. Leach & Simpson, Chicago, have recently put on the market the Ferguson oil furnace and the Ferguson locomotive fire kindler. The oil furnace is largely used in the shops of the Chicago & Northwestern at Chicago and somewhat by various other roads. The purposes for which these furnaces are used by the Chicago & Northwestern include flue welding, annealing boiler and flue sheets, case hardening, heating material for machine forging and riveting and melting babbitt from journal bearings in the brass foundry. The furnace can be of any form

to suit the work as the essential feature is the burner, which can be used with either crude petroleum or fuel oil. The oil is fed to the burner through a small supply pipe, which is fitted with a valve by which the flow is regulated, and the oil may be furnished to the furnace either by gravity or under pressure. The burner is so designed that the pressure causes only a thin film of oil to escape. The air blast, or four or five ounces pressure, chances this into a spray which is ignited and forced into the combustion chamber. A further supply of air fed to this chamber renders combustion perfect and the flame passes thence over the hearth on which is placed the metal to be heated. An important advantage is that the metal will not decarburize as in a coke fire, and it can be quickly brought to the required heat. The saving in cost of fuel as compared with the use of coal and coke is variously estimated at from 25 to 50 per cent. by different users.

The Ferguson locomotive fire kindler consists essentially of a tank for oil, a hose coupling for connection with the compressed air system, a hose terminating in a nozzle for spraying the mingled oil and air, and a valve for controlling the relative proportions of oil and air. The tank is usually mounted on a truck so that it may be easily moved from one part of the roundhouse to another. The tank holds 25 gallons of oil and on an average this is sufficient to kindle fires in 40 engines. The time required is about 45 minutes with a cold engine and perhaps 25 minutes when the engine is still warm, varying according to the temperature. The valve is the principal feature and turning the cock regulates the proportions of air and oil admitted into the tube. Turned one way, air alone passes through and oil adhering to the inside of the hose is removed. When the connections are made a handful of oily waste is lighted and thrown into the ashpan to start the flame. The nozzle, which is at the end of a long tube, is thrust into the ashpan and the flame passes up through the fuel until it is wholly ignited. The fire door being closed prevents the admission of cold air and causes the draft to pass up through the fuel. This is considered an improvement over the old method of blowing through the fire door with the jet of flame striking the firebox sheets, and by the use of this burner less injury is said to be done to the inner sheets than by a wood fire.

The same apparatus is also used as a blow pipe for heating tires, straightening frames, or any other bent work that may require removal and which ordinarily has to be sent to the smithshop to be straightened. For such purposes the heat may be applied at the points required without affecting adjacent parts.

Compressed Air Traction.

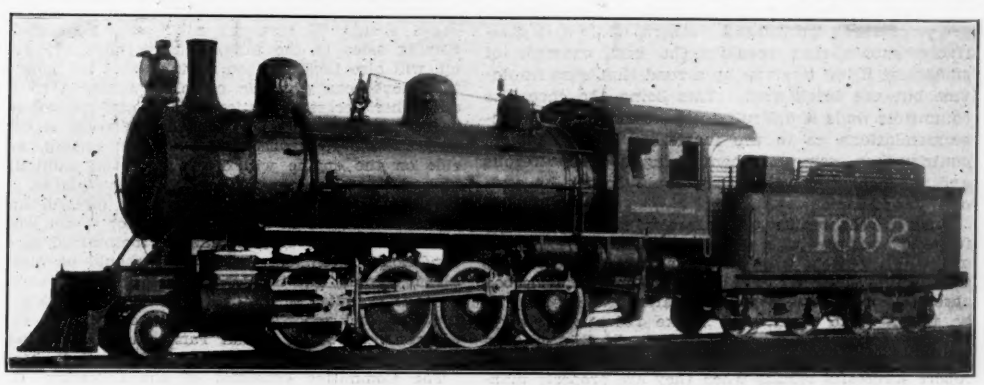
The Compressed Air Company has been incorporated in the State of New York with a capital of $8,000,000. This company is formed for the purpose of taking over the American Air Power Company of New York and the Compressed Air Company of Illinois. The outstanding stock of these companies will be taken up and the transaction will still leave in the treasury of the new company a million dollars of stock which will not be offered for sale. Abundant cash is provided without selling any stock.

The officers of the new company are: President, Henry D. Cooke; Vice-President, Charles H. T. Collis; Treasurer, Henry A. Himley and Engineer, Robert Hardie. The directors other than Mr. Cooke and General Collis are William L. Elkins and Thomas Dolan, of Philadelphia; G. E. P. Howard, Henry Marquand, William C. Duxbury, Newell C. Knight and William H. Kimball, of New York. The consolidated company will own the Hardie and the Hoadley-Knight patents for the use of compressed air for traction purposes.

Considerable business might have been taken by the American Air Power Company, which is financially strong and includes men of great influence, but it has seemed to the company best to go carefully until more information had been acquired by the working of the cars on 28th and 29th streets in New York City and on North Clark Street in Chicago. The information now obtained seems to the officers of the company to justify the conclusion that a direct-connected air motor is superior to a geared motor and the service in Chicago has suggested certain changes which will result in fewer parts, a simplified valve gear, a wider range of valve motion and doing away with the intervening rocker arm. The company feels justified in going ahead and taking contracts and it already has an order from the Metropolitan Street Railway Company of New York for 28 cars, which are being built, and 100 more are to follow. Negotiations are under way for equipment on other roads and one city road of 12 miles is under contract and will be worked by air cars within 60 days.

The company has developed three principal types of cars. One is a 30-ft. single truck motor car, another a 40-ft. double truck motor car, and the other a 60-ft. coach for use on steam railroads, and it is proposed to immediately undertake to enlarge the use of compressed air in suburban work.

We have more than once spoken of the work which has been done with the Hardie motor on North Clark Street. Here a 28-ft. motor car has been running in night service after the cable was shut down and has shown remarkable reliability in bad weather. This is a 28-ft. motor weighing, when in working order, 18,500 lbs., and it has frequently hauled one 30-ft. trailer and sometimes two. It has carried as many as 467 passengers in one trip. The heaviest grades worked have been five per cent. one way and 3½ the other. A remarkable report of the performance of the air cars during stormy weather last winter has been issued over the signature of Mr. Selleck, the General Manager of the Street Railroad Company. Something of this we published a few weeks ago.



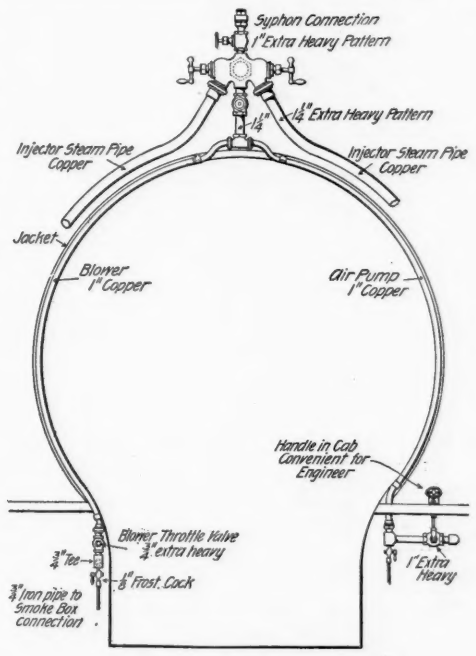
New Consolidation Locomotives of the Oregon Short Line.

Consolidation Locomotives for the Oregon Short Line.

In our issue of March 9 a description was published of the heavy 12-wheel freight locomotives of the Oregon Short Line, of which 12 have been built by the Cooke Locomotive & Machine Company, and similar data are now given for the four consolidation engines recently furnished by the same builder.

The consolidation engines have 21 x 32-in. cylinders, driving wheels 55 in. in diameter and carry a working steam pressure of 200 lbs. The weight on the drivers in working order is 174,000 lbs., the total weight of the engine is 196,000 lbs., and the tender loaded weighs 98,000 lbs., having a capacity for 5,000 gallons of water and 10 tons of coal.

The boiler is of the straight top type with crown bars and the diameter at the front is 78 in. The tube heating surface is 2,755 sq. ft., the firebox heating surface is 218 sq. ft., making a total of 2,973 sq. ft. of heating surface; the grate area is 33 sq. ft.

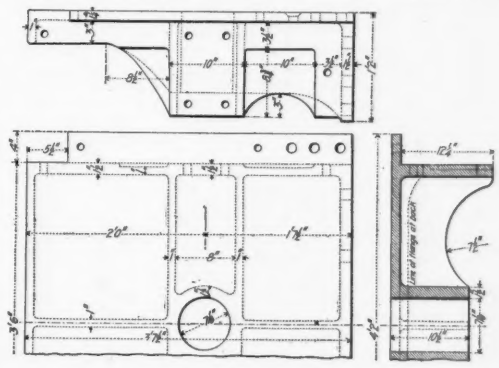


Steam Turret Arrangement.

It will be noted that in the matter of weight and size of both engine and tender these locomotives compare favorably with other recent designs. Fox tender trucks are used, as well as cast steel driving wheel centers, driving boxes, and cylinder heads. The boiler fronts are pressed steel and the steam pipes and eccentric straps are malleable iron, the wearing faces of the latter being babbitted. All bolts are double-nutted and keyed, and all steam cocks, injector throttles and steam connections are outside the cab. The various steam pipes connect to a brass turret, which is attached to the outside of the dome, as clearly shown by the accompanying drawing. The details are also shown of the long-jointed valve stems, and the cast steel deck casting placed between the frames at the forward end.

Mr. J. F. Dunn, Superintendent of Motive Power of the Oregon Short Line, who designed these engines, states that they are doing excellent work. One of the 12-wheelers hauls from 1,650 to 1,700 tons between Pocatello and Dubois, where the ruling grade is 48 ft. to the mile; at Dubois two of the consolidation locomotives couple onto this train and push it from there to Monida, the grade being a little over 2½ per cent. With the new engines, the train load has been a little more than doubled between the last-named points.

The following are dimensions of the consolidation engines not previously given and the principal special equipment used:

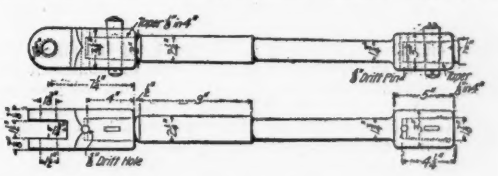


Front End Deck Casting (Cast Steel).

Wheel base of engine, driving	15 ft. 2 in.
Wheel base of engine, total	23 ft. 5 in.
" engine and tender	53 ft. 7½ in.
Center of boiler from rail	8 ft. 9 13/16 in.
Engine truck wheels, kind	Paige steel tired
" " diameter	30 in.
Driving axle journals, size	9 x 12 in.
Engine truck axle journals, size	6 x 9 15/16 in.
Boiler shell, thickness	13/16 in.
Firebox, length	123 in.
" width	39½ in.
Grates	Rocking finger bars
Tubes, number	385
" diameter	2 in.
" length	14 ft.
Valves	Allen-Richardson
" maximum travel	5⅞ in.
" outside lap	15/16 in.
" inside lap	1/16 in.
Steam ports, width	1⅝ in.
" " length	18 in.
Exhaust ports, width	3¼ in.
" " length	18 in.
" nozzle	Single, with petticoat pipe
Netting	2½ x 2½ per in.
Tender.	
Frame	10-in. steelchannels
wheels kind	Chilled cast iron
" diameter	33 in.
Axle journals, size	5 x 9 in.

Special Equipment.

Boiler shell steel, Carbon; steam gages, Ashcroft; sanders, Leach, springs, French; coupler, Buckeye; firebox steel, Carbon; lubricators, Nathan; safety valves, Coale; whistles, Cooke Locomotive & Machine Co.; journal bearings, Magnus metal; piston packing, Jerome; brake beams, Kewanee.



Intermediate Valve Rod.

Smoke Prevention by Railroads Entering Chicago.*

At the October, 1899, meeting of the Western Railway Club a committee was appointed to investigate and report upon what is now being done in the matter of smoke prevention by the various railroads en-

* Extracts from the report of the committee of the Western Railway Club, presented April 17.

tering Chicago, and what lines should be followed to accomplish the results sought after. The committee has found this to be rather a difficult undertaking, especially the last portion of the instructions, as there seems to be quite a diversity of opinion among the different motive power officers as to the value and merit of the various devices advocated for the purpose of preventing smoke. Some arrangements are endorsed heartily by certain parties and are pronounced worthless by others, while it is positively known that possibly the best example of smokeless firing is given by a road that uses no device but the brick arch. This being the case, the committee finds it difficult to make any definite recommendations as to the feasibility of mechanical contrivances, some of them being so preposterous and un-mechanical that they could hardly be seriously considered.

Many of the replies to a circular letter were very full and complete, with drawings. With the exception of the brick arch, which is quite generally used, the air injector (or jet of air forced into the firebox through openings through the water space) seems to be the favorite method of smoke reduction, though some claim that it is more of a smoke diluter than a smoke consumer. Most roads using these air jets report successful results when they are properly manipulated, and particularly when used in connection with a brick arch. They are not claimed, however, to produce economical results, partly due, no doubt, to the fact that the air is more or less cold when it enters the firebox. There are some suggestions for heating the air before it is forced into the firebox, but most of the methods suggested seem to the committee to be impracticable. Several roads reported that their trials of these air jets had been unsuccessful, and especially when used without a brick arch.

In regard to the new engines built for service in and around Chicago, practically all the roads are equipping these engines with one or more of these devices, mostly consisting of brick arches and air jets. In addition, some of the roads are providing boilers with large grate areas and heating surfaces, the grates in some cases being as wide as 6 ft. Of course, only certain types of engines permit this arrangement, and its use is limited. A firebox over 10 ft. in length is handled with difficulty, so that there is practically a limit to the size of grate, unless a special construction like the Wootten is gone into, and this type has some disadvantages.

The smoking of coals depends largely upon their composition. Those high in fixed carbon and low in volatile matter, like the Pocahontas, of southwestern Virginia, will produce little smoke. The Pocahontas is, in fact, advertised as a smokeless coal. It contains from 75 to 80 per cent. of fixed carbon, and about 20 per cent. of volatile matter. The Illinois coals have about half as much fixed carbon and twice as much volatile matter. It is not always the fact, however, that the best coal for heating is the freest from smoke. Coal in the fine or slack condition will generally be more difficult to control in this direction than if broken in proper sized lumps, because there is less opportunity for the air to pass through the grates.

The railroads entering Chicago use a great variety of coals. Those roads running east and south naturally draw from a different territory than those extending to the west and northwest. One road reports drawing altogether from over one hundred mines, and in times of a scarcity, the inferior grades are of necessity bought for consumption in this neighborhood. Some roads in the east have the advantage of coke and anthracite where the prices are as low or perhaps lower than bituminous coal, but they would be practically prohibitive for Chicago railroads, even more so than for factories, as many of the former burn upward of 1,000,000 tons a year. Some of the eastern roads advise that they have difficulty, and, in fact, cannot obtain a sufficient quantity of coke for their needs. Under these conditions the outlook for coke fuel in the west is not very encouraging, until some new sources of coke supply are available at low cost.

The importance of careful firing is recognized by all the roads reporting to the committee, the general sentiment obtaining that a good fireman without a special device is productive of better results than any of these devices poorly managed. Nearly all of the roads have not only issued concise instructions to their engineers and firemen from time to time, but it is a common practice to select expert firemen and employ them to travel on the engines and explain and illustrate the proper methods of firing to those who are less expert in the matter. Nor can all be done by the fireman—the engineer must also assist, both by handing the engine in an intelligent manner and by communicating constantly with the fireman. In fact, to produce the best results, there must be a hearty co-operation between those concerned. The engineer should be quick to appreciate the effects of his manipulations on the fire and regulate the "cut-off" and throttle as far as possible to produce the best results, keeing his fireman informed of his intended movements. The fireman should be on the alert to take every advantage of the physical conditions of the road or any cessation in the work and should fire lightly and regularly—not five or six shovelfuls with a rest in between, but with one shovelful at a time and the door closed gradually—that is, cracked for a few seconds until there is sufficient air to consume the fresh distillates and then closed completely, except where a damper or register in the door is employed. The gage should be scrutinized every few minutes and the supply of air regulated principally by the dampers; the blower and smoke consumer must be ready for instant use on the closing of the throttle, as this is the time that the greatest volume of smoke is likely to be produced.

In order to effect these results, however, the motive power officials must perform their part. In European countries it is considered dangerous to make a man on an engine too comfortable, as such an arrangement may make him careless in his work; the theory obtaining on this side of the Atlantic, however, is that the more comfortably a man is installed, the better can and will he attend to his duties. With this end in view, fire doors should be at a convenient height and of a suitable size, the steam gage should be in comfortable view, both by day and night, the blower or smoke consumer valves should be quick acting and convenient of access from the foot plate, and water gages should be arranged for constant observation. Sloping sides to the tank, and coal properly broken up, will also facilitate the work so that the man with the shovel can give his complete attention to firing and other necessary duties. Many engines are so inconveniently arranged in the cab that it is almost preposterous to expect and ask good results, and a ride on the engine will often show the unintelligent manner in which the fittings have been placed.

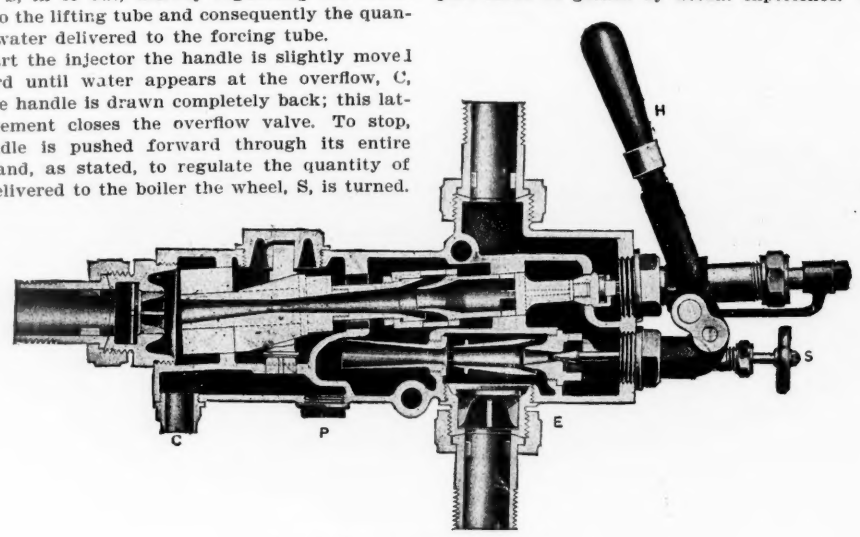
The brick arch should be properly located, and if smoke consumers in the form of air or steam jets are determined upon, they should be maintained in good condition. Intelligent instructions should be given to all enginemen, and they should be taught and expected to take an interest in the results of their work. Individual fuel reports will show the economy of the different crews, on similar runs, and may be considered some index to the smoke consumption obtained.

The Committee consisted of the following: G. R. Henderson, Chicago & Northwestern; R. A. Smart, Purdue University; R. D. Smith, Chicago, Burlington & Quincy; J. C. McMynn, R. W. Hunt & Co., and J. W. Luttrell, Illinois Central.

The Niagara Injector.

The accompanying engraving shows a sectional view of a new locomotive injector put on the market by the Eynon-Evans Mfg. Co., Philadelphia, Pa., known as the "Niagara." It is of the double-tube type and is arranged to be interchangeable with both the Sellers and Monitor injectors, the engraving showing the injector as adapted to the Sellers pipe connections. By interchanging the overflow nozzle, C, with the plug, P, and replacing the screwed water connection, E, with a longer leg, the injector will fit the Monitor pipe connections. This is made possible by having the forcing steam and water tubes connected together and worked directly by the handle, H. It will also be seen that a movement of this handle, and consequently the forcing tubes, opens or closes the vertical overflow valve, making the operation of this valve positive. The capacity of the injector is regulated in the usual way by moving the spindle, S, in or out, thereby regulating the steam supply to the lifting tube and consequently the quantity of water delivered to the forcing tube.

To start the injector the handle is slightly moved backward until water appears at the overflow, C, when the handle is drawn completely back; this latter movement closes the overflow valve. To stop, the handle is pushed forward through its entire stroke, and, as stated, to regulate the quantity of water delivered to the boiler the wheel, S, is turned.



The Niagara Locomotive Injector.

The injector can be used to heat the water in the tender by quickly pulling the handle back through full stroke, which locks the overflow valve closed and allows steam to pass through a ¼-in. opening in the check valve placed in the suction pipe. The suction pipe check valve is used to prevent a large amount of steam passing into the tank should the injector break from any cause.

The parts which usually wear out first are the combining forcing nozzle and the overflow valve, and it will be seen from the engraving that these parts can be replaced at small expense; also by removing the top plug and combining tube the overflow valve can be re-ground.

Tests of the Niagara injector where water at 80 deg. F. was lifted 4 ft. gave the following results:

Size No.	Pipe Connections, in.		Pressure of Steam, Lbs.			
			50	100	150	200
	Iron.	Copper.	Gallons per Hour.			
7	1⅛	1¾	1,198	1,470	1,800	1,920
8	1½	1¾	1,590	1,890	2,310	2,450
9	2	2¼	2,670	2,470	2,950	3,090
10	2	2¼	2,550	3,050	3,540	3,750
11	2½	2¾	3,140	3,620	4,080	4,260
12	2½	2¾	3,720	4,130	4,520	4,870

It was also shown that the capacity of these injectors could be reduced somewhat more than 50 per cent. of the maximum through the action of the regulator.

The Outlook for Engineers.

At the annual meeting of the Boston Society of Civil Engineers the President, Prof. C. Frank Allen, made an address on the outlook for the engineer from which we are permitted to make some extracts, although the address cannot be published in full before it appears in the Journal of the Association.

Mr. Allen points out that during the last 20 years the membership of the Boston Society of Civil Engineers has grown from 94 to 490, an increase of 421 per cent. In the same time the population of Boston increased about 50 per cent., and that of the State 53 per cent. In the same period the membership in the American Society of Civil Engineers increased 371 per cent., while the population of the United States grew only about 56 per cent. These figures indicate what is undoubtedly true, that in 20 years the number of civil engineers has increased far more rapidly than the population.

In seeking for a cause one may perhaps be found in the fact that the quality of the engineer has improved greatly and thus created a larger demand for engineers. This is merely a development of an economic law which may be seen in the growth of transportation and of other products of man's industry and ingenuity. The better the quality the larger the consumption. To a considerable extent the engineer creates his own opportunities. This fact is illustrated by Mr. Allen by several examples which we do not quote.

It can hardly be claimed that the native ability of man has improved much, but it is possible, or even probable, that more young men of superior ability have been attracted into engineering. Among the influences which have contributed to improve the quality of engineers as turned out are the engineering college, the engineering society, and the engineering journals, and probably the engineering college is the most important of these influences. While the successful engineer must have natural capacity he must have also foundation training in theory, and further, he must have knowledge of facts and methods. Part of these requirements the engineering college can meet faster and with less expenditure of energy than they can be met by experience. Another part must be gained by actual experience. On the whole, it must be true that the graduates in engineering are a selected class both from the point of view of natural ability and of thoroughness in training. Furthermore, the engineering graduate will have acquired habits of earnest work, the power of concentration and ability to attack new problems.

It is not assumed that the engineering college is the only way by which to enter the profession. Some of the best engineers have not been graduates, and indeed it sometimes happens that men who in college show little aptitude for the acquisition of knowledge develop in actual work large capacity for engineering. It may be said, generally speaking, that the self-trained engineer travels the more rugged road, but when he is successful develops a strong mental fibre, originality and fertility of resource. Nevertheless, the chances of the self-trained engineer must be relatively fewer in the future and the better positions must be largely filled by engineering graduates.

Second in importance to the engineering school is the engineering society. The papers there presented give descriptions of methods and facts rather than discussion of advanced mathematical theories and they serve to supplement the engineering college. But possibly the engineering society serves a still more important purpose by bringing engineers together and enabling one man to profit by the thought and knowledge of another.

Much of that which has been said about engineering societies is true of the engineering periodicals. The contributions in these are likely to be more fragmentary than the publications of the societies, but to have a broader scope. They reach also engineers who cannot attend the meetings of the societies.

We come next to the discussion of the question of the field which the engineer is to occupy. It will probably be more generally realized in future that the work of the engineer must be economical in construction and in operation; in both these items wherever possible, but at any rate, in the net resultant of the two. The engineer will come to his proper place before the public when it is understood that money is saved by using him and it is gradually realized that corporations or individuals cannot afford to do without him. The economic side of the engineer's work will be more important in the future than it has been in the past.

A legitimate and useful field for the engineer will be in work of execution as distinct from design or supervision. In other words, he will often be a contractor. In the handling of work greater difficulty often arises than in making adequate designs. The Boston subway, for instance, showed the great importance of the development of proper methods which should not interfere with traffic on the streets. The success of the early cantilever construction in the Niagara bridge was not only in good design but in the method of construction, and illustrations could be multiplied. A familiarity with engineering literature would often be of great value to the contractor. Furthermore, many contractors have an inadequate knowledge of the cost in detail of the different items of their work. The more accurate training of the engineer and a closer knowledge of cost would lead to two important results. The actual cost of the work to the contractor would be less and bids based on too low estimates would not be so frequent. The contractor trained as an engineer would, by acquired temperament, be likely to maintain a higher standard of performance.

Still another field is in executive positions in the management of railroads and other corporations. For executive railroad work the most desirable preparation is an education in civil engineering. The accuracy of thought and the honesty of mind developed in the engineering training will here be of great value. Executive ability is in part only inherited, in part it is acquired, and the ability to have work well done implies a suitable technical knowledge of the work itself.

In closing Mr. Allen spoke of the matter of salaries and fees paid to engineers and expressed seriously the idea that engineers are too often willing to work for inadequate salaries, and also when employed by corporations are too often anxious to make the young engineers who come to them work for less than they ought to be paid. He maintains that an engineer unless under severe financial straits should not accept a position at a figure inadequate for the work demanded of him, and gives the example of an engineer who refused to accept the position of chief engineer on an important railroad then building at a salary which he was getting as locating engineer. A few years before this matter came up he had, while waiting for professional work, taken his shovel and worked at days' wages, but he did not allow himself to be beguiled into taking what he considered an inadequate and unprofessional salary as chief engineer. Naturally, he did not have to wait long for the reward for his resolution.

Eight-Wheel Passenger Locomotive for the New York, Ontario & Western Railway.

The accompanying engraving shows a new eight-wheel passenger locomotive built by the Cooke Locomotive & Machine Company for the New York, Ontario & Western. It will be noted that this engine has a deep, narrow firebox, and is designed for burning bituminous coal. This is a slight departure from the general practice of the road as fine anthracite has been used for passenger locomotives for the past ten years. The new engine, however, will run between Norwich and Middletown, and as anthracite coal has to be hauled to Norwich while bituminous coal is received at that point, the cost is rather in favor of using bituminous coal.

The cylinders are 18 x 28 in., the driving wheels are 68 in. in diameter and the total weight in working order is 133,000 lbs., with 88,000 lbs. on the drivers, which have journals 9 in. in diameter by 11¼ in. long. The boiler is of the extended wagon top type, 64¼ in. in diameter at the front of the barrel and carries a working steam pressure of 200 lbs. The firebox is 9 ft. long, 2 ft. 8⅝ in. wide and 76¾ in. deep at the front and 63¼ in. at the back. The firebox heating surface is 167 sq. ft., the tube heating surface 1,696 sq. ft., making a total of 1,863 sq. ft.; the grate area is 24.47 sq. ft. There are 297 tubes, 2 in. in diameter and 11 ft. 1 in. long. The tender weighs, in working order, 82,000 lbs. and has a capacity for 3,800 gallons of water and 10 tons of coal.

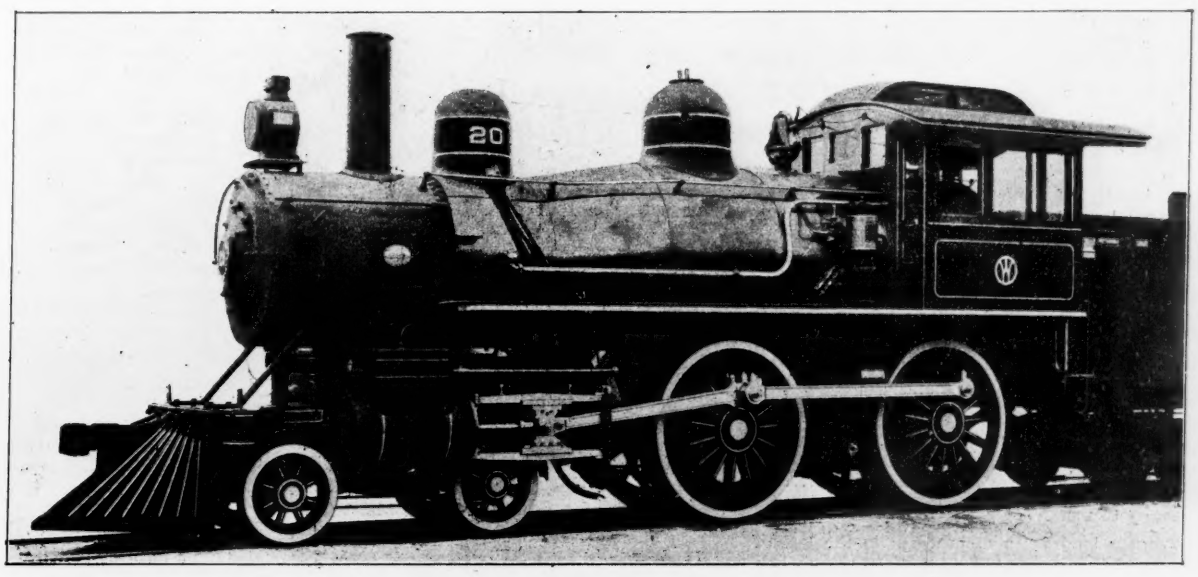
The special equipment includes: Midvale tires, Nathan lubricators and injectors, Coale safety valves, Houston sanding device, Westinghouse air brakes, Stirlingworth brake beams, Lappin tender brake shoes, Ross-Mehan driver brake shoes, Ashcroft steam gages, Pickering springs. Piston and valve rod packing made by the road.

The principal dimensions are as follows:

Gage	4 ft. 8½ in.
Kind of fuel to be used	Bituminous coal
Wheel base, total, of engine	23 ft. 2 in.
" " driving	8 ft. 6 in.
Length over all, engine	37 ft. 8 in.
Height, center of boiler above rails	8 ft. 5⅛ in.
" of stack above rails	15 ft. 1¾ in.
Heating surface, firebox	167 sq. ft.
" " tubes	1,696 sq. ft.
" " total	1,863 sq. ft.
Grate area	24.47 sq. ft.
Drivers, material of centers	Cast iron
Truck wheels, diameter	33 in.
Journals, driving axle, size	9 x 11¼ in.
" truck axle, size	5½ x 11⅞ in.
Main crank pin, size	5¼ x 5½ in.
Piston rod, diameter	3¼ in.
Kind of piston rod packing	Metallic
Main rod, length center to center	7 ft. 1⅜ in.
Steam ports, length	19 in.
" " width	1¼ in.
Exhaust ports, length	19 in.
" " width	3 in.
Bridge, width	1⅜ in.
Valves kind of	Richardson balanced
" greatest travel	5¾ in.
" outside lap	1 in.
Valves, inside lap or clearance	0 in.
" lead in full gear	0 in.
Boiler, material in barrel	Carbon steel
" thickness of material in barrel	⅝ in.
Seams, kind of horizontal	Butt joints
" " " circumferential	Lap joints
Thickness of tube sheets	Back, ½ in.; front, $\frac{5}{16}$ in.
" " crown sheet	½ in.
Crown sheet stayed with	Crown bars and bolts
Dome, diameter	30⅛ in.
Firebox, material	Carbon steel
" thickness of sheets	Sides and back, ⅜ in.; front, ½ in.
" kind	Brick arch
" water space, width	Front, 4 in.; sides, 3 in.; back, 3 in.
Grate, kind of	Rocking bars
Tubes, material	Charcoal iron
Smokebox, diameter	65¼ in.
" length	65½ in.
Exhaust nozzle	Single
" "	Permanent
" " diameter	4¾ in.
" " distance of tip below center of boiler	7 in.
Netting	Wire
" size of mesh or perforation	2½ x 2½
Stack	Straight
" least diameter	15⅝ in.
" greatest diameter	15⅞ in.
" height above smokebox	4 ft.

Tender.

Type	Swivel trucks
Kind of material in tank	Steel
Thickness of tank sheets	$\frac{1}{4}$ in.
Type of under-frame	Wood
Type of truck	Diamond frame
Truck with swinging motion or rigid bolster	Rigid
Type of truck spring	4-group coil
Diameter of truck wheels	33 in.
Diameter and length of axle journals	4¼ x 8 in.
Distance between centers of journals	6 ft. 3 in.
Diameter of wheel fit on axle	5⅜ in.
Diameter of center of axle	4⅝ in.
Type of truck bolster	Wood with ¾-in. plates.
Length of tender frame over bumper	24 ft. 3 in.
Length of tank	20 ft. 3 in.
Width of tank	9 ft.
Height of tank, not including collar	4 ft.
Height of tank over collar	4 ft. 10 in.
Type of back drawhead	Thurmond
With or without water scoop	Without



Eight-Wheel Passenger Locomotive—New York, Ontario & Western.

Safety Appliances in Mexico.

We have several times recently mentioned the provisions of the order issued by the Mexican Government requiring the railroads running in that country to equip their cars with certain safety appliances. We have now received the text of the order and give below a translation pretty nearly in full. The order was issued Jan. 23 from the Department of Communications and Public Works. It will be observed that the Department does not know as much about vertical plane couplers as it ought to know, but we suppose that various manufacturers have by this time added to the knowledge of the Department on that subject.

It is demonstrated by statistics that in the majority of cases the accidents occurring to employes on the trains are due to the system of couplers used on most of the lines, said system consisting of pins and links. . . .

Another cause of accidents to brakemen is the necessity they have of running over the roofs of the cars when the trains are moving, also of climbing to them and getting down from them, which is very dangerous on account of the cars not keeping the same distance apart by reason of the system of couplers above described.

It is the duty of this Department to protect passengers as well as railroad employes against danger by dictating such measures as will diminish the risk they run of losing their lives or getting crippled, and on that account the experiments made by some corporations for the adoption of couplers giving the most satisfactory results have been carefully watched by us, and as not all the companies hasten to change for the better in this particular their rolling stock and those who have started to make the change do not appear to be in a hurry to finish up the job, it has been resolved by this Department that a term be fixed within which automatic couplers shall be adopted both for freight and passenger service.

Experience has demonstrated that the best system is the one called "vertical plane automatic coupler," and that, although a great many of this kind of couplers have been invented in our neighbor Republic, only the Janney and Gould couplers as regards freight service, and the Miller and Janney for passenger cars, have proved to be efficient and economical, and inasmuch as it is advisable to secure in what may be practicable the uniformity that will permit the interchange of cars by the various lines, it is hereby decided that the above mentioned couplers will be the couplers that must be used by railroad lines in Mexico unless by this date a large portion of their rolling stock has been equipped with other couplers which conform to the above mentioned system. . . .

No new equipment will be put in service unless it is furnished with the automatic coupler that may be adopted by each corporation, notice being first given to this Department as regards the type adopted.

Also, when a drawhead is destroyed, instead of having it repaired it will be replaced by an automatic coupler, and the necessary number of couplers will be replaced annually to effect the total change within the term that may be fixed.

A term will be also agreed upon within which all the freight and passenger equipment must be supplied with safety chains and the freight cars provided with ladders . . . and the roofs of the cars fixed with small railings close to the brakes and platforms which will make it easy for the brakemen to pass from one car to the other. . . .

This note is referred to you for your information and in order that the company you represent may submit to this Department for approval the system of railings, platforms and ladders to be used on freight cars, stating the system it intends to adopt for couplers and proposing the term within which the company expects to comply with the provisions of this resolution of the Department. The company must also send to this Department a statement showing what portion of its present equipment is furnished with automatic couplers and what portion is not, and inasmuch as uniformity in relation with the matter is one of the conditions desired, the

railroad companies are requested to try to come to an agreement as regards the system to be adopted on the understanding that, in case of failure on the part of the companies to agree on joint action, this Department will select one out of those herein mentioned.

The Position of Wheel Loads Causing Maximum Stresses in Web Members.

By M. A. Howe.*

Within the limits of this article it will be possible to consider only simple trusses which have one set of web members vertical. These may be divided into two classes; one in which the two chords, cut by a section crossing one web member, intersect, when prolonged, without the span; and the other, in which they intersect within the span or between the two supports. It is seldom that the second class is employed for railway bridges, so the first class of truss alone will be considered.

Let Fig. 1 represent such a truss having both chords inclined and carrying a horizontal roadway by means of floor beams at verticals passing through the panel points.

Let

W = the total live load carried by the truss.

a = the horizontal distance of the center of gravity of W from one support—in the following demonstrations, from the right support.

P^1 = the amount of W at the head of the load which lies in one panel.

z^1 = the horizontal distance of the center of gravity of P^1 from the first panel point wholly within the load W, and

Q^1 = the reaction of P^1 at the panel point immediately ahead of the load.

The remaining nomenclature is evident from Fig. 1.

In general, then (see Fig. 1),

$$R_1 = \frac{W\,a}{n\,d} \text{ and } Q^1 = \frac{P^1 z^1}{d}.$$

(a) Position of wheel loads causing a maximum stress in any diagonal D_m.

There are three cases which occur in practice.

First.—A diagonal in a panel which is not subdivided, as in Fig. 2.

Second.—A diagonal which is subdivided and acts with the sub-diagonal upon the left of its center, as in Fig. 3.

Third.—A diagonal which is subdivided and acts with the sub-diagonal upon the right of its center, as in Fig. 4.

Let the lengths of the verticals through the ends of the diagonal which is being considered be h and h^1, as shown in Figs. 2, 3 and 4. Prolong the chords eg until they intersect in O, and take this point as the center of moments, then, from Figs. 2, 3 and 4,

$$D_m y = R_1 s - Q^1[s + (m-1)d] \ldots\ldots\ldots\ldots (1)$$

and

$$s = \frac{h^1 - m\,(h^1 - h)}{h^1 - h}\,d.$$

Substituting the values of R_1, Q^1 and s in (1), differentiating with respect to a and z^1 and placing the first derivative equal zero,

$$\frac{W}{n\,d} = \frac{P^1}{\dfrac{h^1 - m\,(h^1 - h)}{h}\,d} = \frac{P^1}{d^1} \ldots\ldots\ldots\ldots (2)$$

or,

The average load for a distance d^1 to the left of h^1 must equal the average load upon the truss when the diagonal D_m has a maximum stress.

The value of d^1 is readily computed, or can be obtained graphically as follows: At A, Figs. 2, 3 and 4, draw the vertical MN until it cuts the prolongation of the chords eg in M and N. The distance $MN = h^1 - m\,(h^1 - h)$. Through M draw MR parallel to Ng until it cuts the diagonal drawn from the bottom of h^1 to the top of h in R, then the horizontal projection of Rg, that portion of the diagonal below R, will be the value of d^1.

From Figs. 2, 3 and 4, by similar triangles,

$$d^1 : MN = RS :: d : h, \text{ or } d^1 = \frac{M\,N}{h}\,d,$$

which is the value of d^1 in (2).

When the chords eg are parallel, $h = h^1$, and the well-known formula

$$\frac{W}{nd} = \frac{P^1}{d}$$

follows directly from (2).

If the wheel loads are replaced by an uniform load, then

$$W = m\,(x + m^1 d) \text{ and } P^1 = mx,$$

in which w = the uniform load per unit length of the truss span and x the distance which the uniform loads extend into the panel ahead of h^1 when the stress in D_m is a maximum. Placing these values in (2)

$$\frac{w\,(x + m^1\,d)}{nd} = \frac{w\,x\,h}{[h^1 - m\,(h^1 - h)]\,d} \ldots\ldots (3)$$

The value of x can be easily found from (3) but the graphical determination of its value is somewhat more direct.

In Fig. 5 prolong the chords eg as before, cutting off the distance $MN = h^1 - m\,(h^1 - h)$ at A. Prolong the bottom chord until it cuts the vertical through B in N^1. Connect M and N^1 by a right line cutting the diagonal eg in R^1 (eg must be drawn as shown from the bottom of h^1) then the horizontal projection of R^1g is the value of **x**.

From similar triangles:

$$x : R^1S^1 :: d : h \text{ or } R^1S^1 = \frac{x\,h}{d},$$

also

$$x + m^1 d : R^1S^1 :: nd : MN \text{ or } \frac{x + m\,d}{n\,d} = \frac{R^1\,S^1}{M\,N}$$

which equals $\dfrac{x\,h}{[h^1 - m\,(h^1 - h)]\,d}$. Multiply both members of this equation by w and (3) is the result.

For parallel chords (3) becomes

$$\frac{w\,(x + m^1\,d)}{n\,d} = \frac{w\,x}{d} \ldots\ldots\ldots\ldots (4)$$

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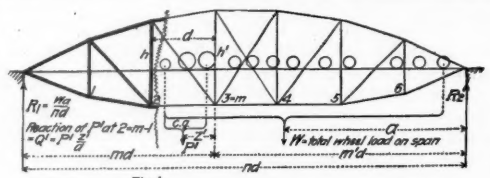
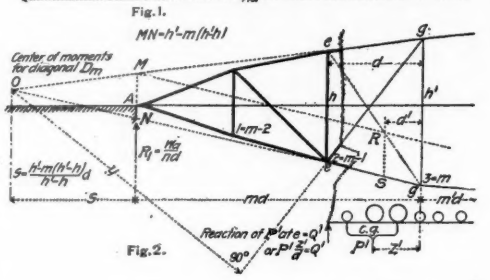
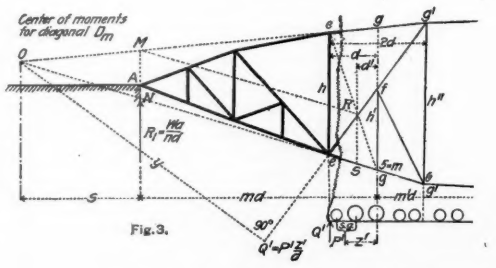
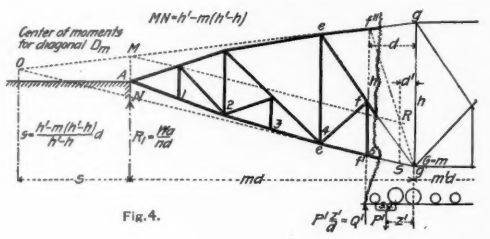
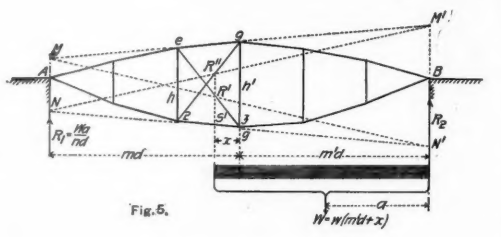
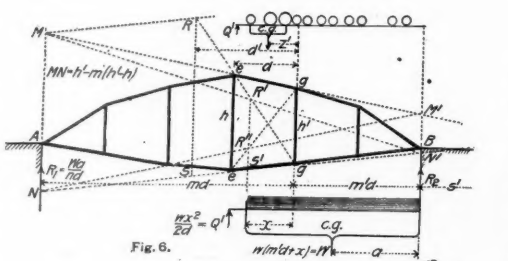


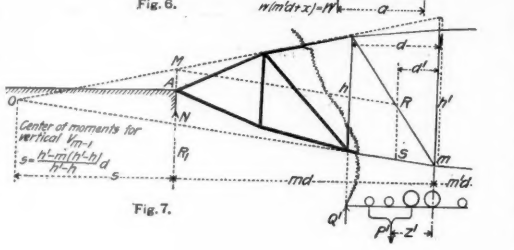


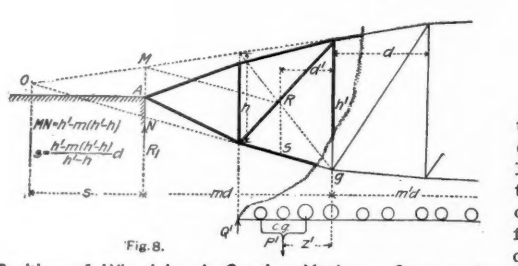












Position of Wheel Loads Causing Maximum Stresses in Web Members—Howe.

from which

$$x = \frac{m^1}{n-1}\,d,$$

a well-known expression.

In case the chords are inclined as shown in Fig. 6, the form of the expression for the position of the wheels causing the maximum stress in the diagonal D_m remains the same, as does also the graphical determination of d^1 as shown in Fig. 6.

(b) Position of wheel loads causing a maximum stress in any vertical member of the truss.

Two cases occur in practice as shown in Figs. 7 and 8.

From Fig. 7,

$$\frac{W}{n\,d} = \frac{P^1}{\dfrac{h^1 - m\,(h^1 - h)}{h}\,d} = \frac{P^1}{d^1} \ldots\ldots\ldots 5$$

The value of d^1 can be found graphically as shown in Fig. 7.

From Fig. 8,

$$\frac{W}{n\,d} = \frac{P^1}{\dfrac{h^1 - m\,(h^1 - h)}{h}\,d} = \frac{P^1}{d^1} \ldots\ldots\ldots (6)$$

The value of d^1 can be found graphically as shown in Fig. 8.

For parallel chords (5) and (6) become

$$\frac{W}{n\,d} = \frac{P^1}{d} \ldots\ldots\ldots\ldots (7)$$

For uniform loads and chords inclined as shown in Fig. 6, follow the general method given above.

In Figs. 2-8 inclusive it is seen that the same graphical construction has been used in finding the values of d^1 and x. This may be stated in a general form as below:

1°. Make a section through the truss cutting the web member, in which a maximum stress is desired, an upper and a lower chord, only. In trusses with subdivided panels the sub-truss is to be considered as a part of the chord of the main truss in considering diagonals not acting with the sub-diagonal and for verticals.

2°. Prolong the chords which are cut until they intersect the vertical through the support of the unloaded segment of the span in points M and N.

3°. From the point M where the upper chord cuts this vertical draw a line MR parallel to the bottom chord which the section cuts.

4°. Draw verticals through the panel points upon the right and left of the load P^1 until they intersect the chords which have been prolonged.

5°. From the bottom of the right vertical to the top of the left vertical draw a diagonal intersecting the line MR in R.

6°. The horizontal projection of Rg, the lower portion of this diagonal, is the value of d^1 in the expression

$$\frac{W}{n\,d} = \frac{P^1}{d^1},$$

which is the criterion for the position of wheel loads causing a maximum stress in the web member considered.

7°. If the bottom chord which is cut be prolonged until it intersects the vertical drawn through the support of the loaded segment of the span in N^1 and the right line MN^1 drawn cutting the diagonal Rg in R^1, then the horizontal projection of R^1g is the value of x, the distance which the uniform load must extend into the panel to cause a maximum stress in the web member considered.

From the several cases treated above it becomes evident that, if the verticals h and h^1, subtended between the cut chords, be drawn through the ends of the stringer of the length, d, supporting the load, P^1, the graphical methods are perfectly general regardless of the inclinations of the web members or the equality of the panels, as long as the cut chords intersect without the limits of the span. The general criterion is, then,

$$\frac{W}{l} = \frac{P^1}{d} \cdot \frac{h}{MN} = \frac{P^1}{d^1}.$$

Some Details of Electrical Equipment.

At the February meeting of the American Institute of Electrical Engineers Mr. Edward C. Boynton (New York, New Haven & Hartford RR. Electrical Department) presented a paper on "Electric Traction Under Steam Railroad Conditions." In the course of his remarks he spoke especially of wiring for electric traction. He was talking, not of trolley cars, properly so-called, but of cars run by current taken by a collector from a third rail, as is the universal practice on elevated railroads wherever electricity is used. Concerning this he said: "The most careful work in wiring cars is very essential. The author believes that the causes of nearly all fires occurring in motor cars can be traced to defective wiring . . . in trolley wires the removal of the pole from the wire will put out or render a fire easy to control, but in such cars as are under discussion I have not yet seen or heard of a method of cutting off the current at or near the contact shoes, though there may be such. It is evident, therefore, how helpless a train crew is when called upon to put out a fire caused by a terrific arc under the car."

The reader will remember that in recent times there have been a number of cases of burning elec-

tric cars on the elevated railroad in Brooklyn, which indicate that the danger pointed out by Mr. Boynton is not entirely imaginary. In order to get some notion of the seriousness of that danger, as illustrated in Brooklyn, we caused a search to be made, a month ago or so, of the files of the Brooklyn Eagle for several weeks and made inquiries from several responsible people.

We find it reported on Jan. 23 that "for the third time since the installation of electricity on the elevated lines in Brooklyn a motor car was burned." It is said that there were four other cases where cars were set on fire, but not burned completely. The newspaper account tells us that it was difficult to get water to the fire and that the firemen feared to work on the structure because of the current on the third rail. Finally, the current was shut off at the power house, but the firemen were at work 45 minutes in all and the cars on the surface lines were blocked 35 minutes.

Within a week or two the daily papers have told of still another case of a car on fire. The story is that motor car No. 254, with three trailers, on its way to the bridge in Brooklyn blew out a fuse and "in a short time the car was in flames. The motorman tried to run to the nearest station, but before he reached it the fire was too hot and he stopped the train. A brakeman had meantime tried to put out the fire with the chemical extinguisher, but to no avail. In a short time three fire engines and a hook and ladder company arrived and extinguished the flames. Not much damage was done to the motor car."

These are the only cases that we find of actual burning of cars on the elevated railroads of Brooklyn, but we have not searched far. Many delays, however, have taken place because of defective details in the electrical work.

Feb. 2 a fuse blew out on the Fifth Avenue line and there was a blockade. The night of the same day another blockade occurred from the same cause. It was 20 minutes before the cars could be started and many passengers climbed down to the street from the structure.

Feb. 3 a fuse blew out on an elevated motor car, causing a delay of about half an hour and stalled trains on various parts of the line.

Feb. 5 a motor car broke down on Myrtle Avenue near the City Hall station of the elevated and there was a delay of half an hour. Passengers got down on the structure and walked to the station, "and one of those who did this stepped on the third rail and received a shock and fell into the street." On the same day apparently a motor car on the Fifth Avenue line was stopped by the burning out of a fuse, causing much delay.

On the 7th of February the Brooklyn newspaper said that motor car fires on the lines of the Brooklyn Rapid Transit Company had become so numerous that the Department of Public Buildings, Lighting and Supplies had decided to avail itself of the clause of the charter which allows it to inspect and supervise all electric wiring in the city. After this preliminary investigation we followed the matter no farther, although the subject is a tempting one. Enough has probably been said to suggest a fruitful field of inquiry to those interested in electrical working, especially by third-rail conductors.

Some Construction Work of the Boston Elevated Railroad.

By Edgar M. Smith, C. E.

In the Railroad Gazette of July 7, 1899, there was shown the location of the connection of the elevated structure with the north portal of the Boston subway with its two outer tracks, the north and the southbound. These tracks are now being connected at the south portal with the elevated structure at the junction of Washington Street and Castle Street, by a roadway from Porter Street.

The surface cars emerging from the subway at Pleasant Street make a sharp turn to the right and to the left on the 5 per cent. ascending grade to Tremont Street and to Shawmut Avenue, as shown in the accompanying sketch. This is about 700 ft. from the entrance to the subway. In order to avoid surface obstructions, it is proposed to do away with the inside tracks and to extend the tunnel under Pleasant Street at a 1.5 per cent. descending grade, and at a curvature of 250 ft. and 100 ft. radius on the north and the southbound tracks respectively. From this point, the grade ascends at 5 per cent. with an average curve length of 137 ft. and a tangent of 260 ft. It crosses the Boston & Albany and the New York, New Haven & Hartford RR. cut with a 3.85 per cent. grade and a curve of 207 ft. radius until it intersects a tangent on Castle Street, when the grade becomes 2.25 per cent. The 5 per cent. grade is bordered throughout its length by handsome rock-faced granite retaining walls, and three granite piers beyond carry the tracks to the railroad cut. A station will be erected at Pleasant Street having long granolithic platforms.

The space under the incline at Kirkland and Corning Streets will be used for a storage battery room containing 240 cells, the excavation for which is shown in the accompanying engravings from a photograph. This space, which otherwise would have been wasted, will be used for the storage of accumulated surplus energy amounting to 1,500 kw. when the station load is at its minimum, this surplus to be used, of course, as a reserve to relieve the generators at times of maximum load. The inside dimensions of this building are 37 ft. x 61 ft. 9 in., with a booster room in the rear, about 17 ft. x 19 ft. The concrete piers, 8 ft. x 8 ft., for the posts of the track structure are contained in this area. The location of this incline is on the site of a block of tenement buildings, which were torn down after being acquired by the railroad. Some of the adjoining buildings abutting on this land were altered to suit the layout of the roadway.

The portion of the railroad cut referred to is 130 ft. in width, and is bounded by Corning and Castle streets. In here are two granite piers built on 40 ft. spruce pile foundations, the larger one being 92 ft. long. They support the posts of the elevated tracks, which in turn carry the loads of the longitudinal girder and spans, measuring 35.8 ft. and 61.8 ft., as well as four cross girders spaced 17.5 ft. center to center and varying in length from 36 ft. to 46 ft. On curves, the tracks have 13 ft. centers, but on tangents only 12 ft. On Castle Street, the elevated structure adjoins the granite retaining walls of the New Haven Railroad, and one row of posts rests on the 16 in. coping and is dowelled 12 in. in depth by 1½ in. bolts.

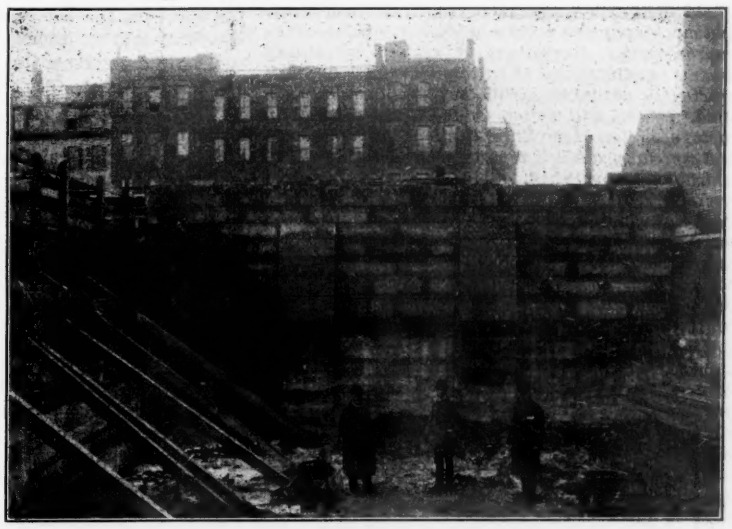
One of the finished piers and the manner of bracing the excavation at Corning Street north of the railroad cut are shown in the accompanying photograph. Some fine monolithic work has been done here.

Test borings of the underlying strata were taken and showed at Pleasant Street 10 ft. of filling gravel, sand and clay, 8 ft. of hard yellow clay, and below this, stiff blue clay. The stratum of yellow clay gradually drops to the depth of 28 ft. below Corning Street grade and here appear in addition silty sand and some peat. The foundation for piers consists of 19 ft. of Portland cement concrete; 12.5 ft. of this has a width of 10 ft. to elevation 8.5, and above it the wall batters on the front to 4 ft. at the top of foundation, or elevation 15. Upon this concrete foundation is the pier, 9.5 ft. in height, built of granite dimension stone fine-pointed on the back and rock-faced on the front.

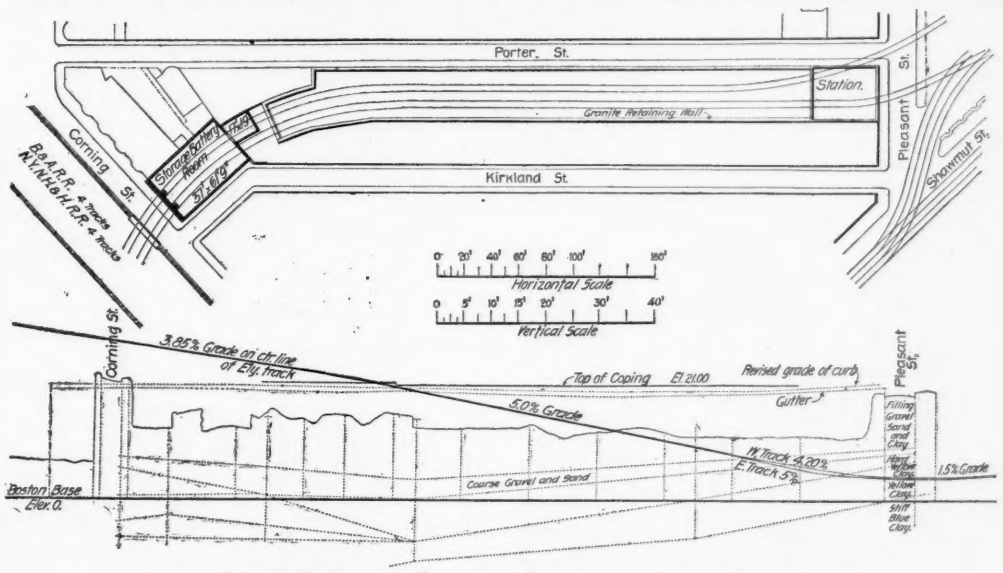
Lehigh and Atlas cements were used throughout. The concrete was made up of different sized broken stone in the several proportions of 1:6:12, 1:4:8, and 1:2½:5, respectively, according to the height of foundation and relatively smaller dimensions.

Incident to the construction work is the preparation of the track in the subway for the elevated cars. The present steel guard attached to the rails is being removed and replaced by 6 in. x 6 in. yellow pine inside guards, owing to a greater safety and a greater flange of wheel than that used on the surface cars. The third rail is also being laid 18 in. from gage and on 6 in. blocks attached to every third tie, which is longer than the others and is slightly raised above the running rail. To prevent the chipping off of concrete, some alterations have been made on the arched roof of the subway to provide ample clearance for the large elevated cars which will be used. The incandescent lights, formerly hung on the walls, have been removed and placed above in the roof near the center of the tracks.

The iron work of the connecting line at Castle Street has not been erected; but the Roxbury Division from Castle Street to Dudley Street terminal has been completed.



Construction Work on the Boston Elevated at Kirkland and Corning Streets.



Elevated Railroad Tracks at the Entrance of Subway near Pleasant Street—Boston.

Foreign Railroad Notes.

The Russian authorities have raised the freight on petroleum from the Caspian to the Black Sea (Baku & Batum) just one-third, from 6 to 8 cents per pood (36 lbs., which is very nearly 5 gallons). This is the direct and natural outlet for the Caspian petroleum to western Europe, and heretofore the chief changes in the tariff have been reductions. The distance is 560 miles, so that the new rate is about 0.8 cent per ton per mile.

A Prussian railroad officer, in a paper before the Berlin Railroad Society, showed that more than one-fifth of the accidents to trains in stations are due to throwing switches while the trains are still on them; that is, the switchmen are "too previous."

A corpse traffic is counted upon for a large part of the support of a branch of the new Bagdad Railroad which the Germans are to build. The branch would reach Kerbela, which is visited by Persian Mohammedan pilgrims (Shiites) and is considered as a particularly healthy place to be buried in, if the expression may be allowed. At least the promoters of the railroad estimate that it will have 100,000 corpses as well as 150,000 pilgrims to carry yearly.

A blast furnace company in Alsace has had to pony up $45,000 for billing its ore shipments under the actual weight for a number of years. When the railroad got track of the under-billing, it ordered a train of ore cars to be weighed at a certain station, and by mistake notice was sent to the shipping company. The train stood on a siding over night before the weighing, and in the morning there was a little pile of a few hundred pounds of ore on each side of each car. This ruined the company's defence that it "didn't know" that the cars were overloaded.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to improvements. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The Supreme Court of the United States has declined to compel the express companies to pay the internal revenue tax of one cent on each bill of lading. The press dispatches, summarized in another column, do not give a very lucid statement of the decision, but the main point appears to be plain; that there is no law prohibiting a carrier from compelling shippers to pay the tax, if it finds itself able to do so. The question whether 26 cents is a reasonable price for carrying a package which formerly was carried for 25 cents, appears not to have been brought before the court in this case. If the shippers now wish to proceeded further they must try this point. Obviously, it will be a difficult one to adjudicate, if the carrier is to be allowed any discretion at all; and even if a state were to prescribe every rate in the tariff, naming it in rigid figures, it would be difficult to to settle the relative justness of a 26-cent rate and a 25-cent (for a whole shipment) by any rule of equity. As bills of lading for freight occupy the same position before the law as those issued by express companies, we see no reason why a railroad cannot now shift the burden of this tax to the shippers, if it see fit to do so. But there is no sign, at present, that any of the prominent roads will see fit. The income, per shipment, is very much greater, of course, in the case of freight than in the case of a parcels business, and the proportional burden of the tax on the carrier is correspondingly smaller. This fact illustrates the gross inequality of the tax.

Railroad gross earnings continue to show their course of remarkable improvement. The Chronicle's reports of 117 roads for March, 1900, show an increase in gross earnings of $6,340,000 or 12½ per cent. over the earnings of the corresponding month last year. The record of 116 roads for the three months of this year shows an increase in gross earnings of over 23 million dollars—higher by more than five millions than for any year since the panic. Last year the increase for March aggregated 6.35 per cent. over the previous, and in 1898 it amounted to 15.25 per cent., though the total increase was slightly less than this year. This improvement extends to all sections of the country. Of the roads reported, less than one in eight, and those small ones as a rule, showed any decreases. Of the roads whose changes in gross earnings for the month exceed $30,000, only one, the New York, Ontario & Western, reports a falling off. The Great Northern System leads all others in increases for March with $596,000. Among the other leading ones are the Baltimore & Ohio, $515,000; the Illinois Central, $406,000; the Southern, $360,000; the Northern Pacific, $312,000; the Chicago, Milwaukee & St. Paul, $294,000 and the Louisville & Nashville, $289,000. Perhaps the most remarkable gain has been that of the 13 roads classified as the Northwestern and North Pacific group. Their gross earnings for March were nearly 13½ millions. Six years ago the earnings of these same roads for that month were 7½ millions. The Southern group of 11 roads gains from 6½ millions in 1895 to nearly 10 millions in March, 1900. The Chronicle notes that the roads in the coal and manufacturing districts are being most favored by the existing trade prosperity. The Hocking Valley, for example, whose traffic consists largely of bituminous coal, though a small road, reports an increase of $131,000. The increased cotton movement has had its effect upon the Southern roads. The receipts at the Southern outports for March of this year were 450,000 bales, against 377,000 last year. At the same time the receipts of cotton at Galveston fell off 6,000 bales. There has also been an increase in the shipments of wheat, which has affected the Western roads. The receipts in the primary markets in the West for the five weeks ending March 31, 1900, were 19½ million bushels, against only 16¾ million bushels the corresponding weeks of last year. Yet at Chicago, Kansas City and several other points, the wheat receipts this year were smaller than a year ago. During the same weeks also the receipts of corn have made a gain over the receipts of the preceding year of some eight million bushels; oats, two millions and barley 2¼ million bushels.

Air Brakes for Heavy Freight-Trains.

At the last meeting of the Air Brake Association, reported in our issue of April 13, it was clearly shown that the problem of successfully handling heavy freight trains is only partly solved when locomotives have been provided capable of hauling the increased tonnage. Much has been said about heavy locomotives for hauling larger trains to the summits of grades, but little has been published about the difficulties encountered with these long, heavy trains on descending grades, or about the changes in practice needed to meet the new conditions. This was the most important subject considered by the Association, and its report shows that a number of features of the question involve the practice of all roads, and on roads with heavy grades the co-operation of the operating and mechanical departments is especially important.

Careful tests with long trains on steep descending grades have shown that the practice of applying train pipes to cars not fitted with the air brake should be stopped and air brakes should be applied to all freight cars not yet equipped. The air brake equipment is now improperly maintained, and while the condition of the brakes is often bad enough on cars kept running on the home road, the brakes of foreign cars are in even worse condition. Retaining valves should be raised to the efficiency of the present standard type, large air pumps should be used and the main reservoir capacity increased. These are things that apply in general to most roads. On mountain roads the speed at which heavy freight trains are run on descending grades is too high for safety, and the handling of the brakes by the enginemen can be improved. The element of speed is especially important, and some information regarding the brake tests of heavy trains used as the basis of the committee report will be given in a later issue.

An important question brought up at the same meeting, was the braking of large-capacity freight cars, about which there has been a good deal of discussion. It is held that there is no immediate cause for anxiety on this score, and that if all such cars have air brakes that are kept in good condition, if the braking pressure is made 80 or 85 per cent. of the light weight of the car, instead of 70 per cent., and if excessive speed down grades is avoided, such cars can be handled in trains with even greater safety than have been trains of smaller capacity cars in the past. A number of roads are thus increasing the braking pressure on freight cars, and while a still higher pressure could be used when the cars are loaded, other things being equal, it means a greater chance for slid wheels on empty cars when run in the same train with loaded cars. This increase, however, seems to be warranted in view of the small number of emergency stops, where there is danger of skidding, in proportion to service applications.

There is also, in many cases, an additional reason for increasing the braking power which has not been mentioned, and that is the extensive use within the last few years of extremely hard brake shoes, known to have a co-efficient of friction from 20 to 50 per cent. lower than ordinary cast iron. These brake shoes have become popular chiefly on account of their greater wearing qualities and where such substitutions have been made an appreciable increase in braking pressure can be made without danger of skidding. The best opinion, however, is in favor of going further and actually providing about 20 per cent. greater braking power than has heretofore been considered good practice. The argument advanced is that the greater tonnage that can be safely handled in this way warrants taking the chances of a few slid wheels on empty cars when the rail conditions happen to be unfavorable, and any additional cost on this account is more than offset by the larger train loads. That is, the net result is an economy. It is a position similar to that now taken by most mechanical men, that larger train loads warrant an increased investment for heavier rolling stock and an increase in the cost for supplies and repairs

Extra Block-Signal Safe Guards in Time of Fog.

The inspecting officers of the Board of Trade, who, in a practical sense, may be called the lawgivers of Great Britain on many points concerning the mechanical side of railroading, appear to be convinced that the railroads of the United Kingdom ought to improve their means or methods of fog signalling; but they refrain from making any specific recommendation.

The latest outgiving on this subject is a report from Colonel Sir F. A. Marindin, the senior inspecting officer, on a collision which happened on the South Eastern road near London Bridge Dec. 6. The essential cause of the collision was the negligence of the engineman of a passenger train in running past a home signal; but there was a dense fog at the time, and if there had been a torpedo at the signal the engineman would have been checked and the collision prevented. Colonel Marindin says that the railroad companies ought to take serious steps to select some appliance which will enable a signalman to protect the line, "at least until the fog signalmen can have time to reach their posts." In the present case the collision occurred soon after six o'clock in the morning at a time when the night men who could act as fogmen had gone off duty, while the track laborers had not yet come on, though it appears that at all times except near Christmas these men are on duty at six o'clock. Colonel Marindin thinks that to permit a train to come to the home signal of a station during a fog, when there is a freight on the main line, only 720 ft. ahead of this signal, "is really courting disaster."

At Wivelsfield, on the London, Brighton & South Coast, Dec. 23, at 6.14 p. m., there was a rear collision of passenger trains and five passengers were killed or fatally injured. The cause of this accident appears to have been substantially the same as that of the London Bridge collision. In this case the inspector, again recommending the improvement of the fog signaling regulations, calls attention to the fact that the latest rules adopted by the associated railroad companies require that during a fog, until fog signalmen can be called and assigned to their posts, a signalman must keep trains two block sections apart. That is to say, B must not accept a second train from A until the last preceding train has reached C.

Why should not the English railroads adopt an automatic mechanical detonator or torpedo apparatus such as has been in use in America for the last ten years or more? This apparatus has been tested for eight years in severe service in the two-mile tunnel and cut in Fourth Avenue, on the four-track approach to the Grand Central Station, New York City, where, although the fogs are not very bad, they are reinforced by smoke. On these eight miles of track the torpedo machines put in about 1892 have given satisfactory service ever since. The only serious wear is on the cap of the torpedo itself, which is automatically pushed to its position in the path of the wheels every time the signal is placed in the stop position; and the inspectors protect the torpedoes against impairment from this wear by changing them whenever necessary, taking a torpedo from the bottom of the pile in the magazine and putting it on top.

To provide a method for protecting trains until the fogmen come on duty and then to abandon it, sounds odd to an American. If it is a safeguard, why not maintain it continuously, until the fog vanishes, and save the trouble, expense and danger of stationing men at the signals? If it is not a safeguard it should not be employed at all. We heard not long ago that a prominent American road had temporarily ordered passenger trains kept two blocks apart, during a snow-storm; but that was just after there had been a rear collision of passenger trains, which was due to an engineman running past a home signal where he had no distant signal. The feeling of horror which comes to a superintendent when he has such a collision as that may excuse a radical move; but a charitable critic would assume that the order, in this case, was to tide over the time that would be required to put in distant signals, or "jack up" the discipline, or both.

Colonel Marindin says that we are courting disaster if we depend upon the engineman to see and obey a fixed distant signal when his view of the signal is shortened by a fog. But as this practice, thus characterized as recklessness, is common in America and has been so for years, it would seem fair to appeal to the testimony of experience. What has been the result of this long course of courting disaster? While there are no statistics available, a review of the accident record as a whole gives the impression that the number of collisions from this cause is exceedingly small. It is to be remembered that the only situation now under consideration is that of a pair of signals—a home and a distant—which are all right in clear weather but are deemed inadequate in a fog. It is true that in America, as elsewhere, collisions are now and then reported which are caused by running past both a distant and a home signal; but these appear to occur oftener in fair weather than in fogs. This being the case, it is fair to conclude that the runner neglects the distant signal, not because it is impossible to see it, but because he does not maintain a close watch for it. Every superintendent can confirm this from his own experience. It is true that it is harder to watch for a signal in a fog than in fair weather, but it is well understood that runners must, and they actually do, increase their watchfulness under such adverse conditions, even to the extent of reducing speed oftentimes.

To make sure that trains will stop at home signals is better than to provide against collisions in case they do fail to stop. Neglect of distant signals is common enough, even in fair weather, to warrant the utmost endeavor to correct the evil, regardless of weather. This correction effected, we shall find that we have taken some very effective steps toward preventing collisions in fogs, for we shall have given the engineman some valuable training in habits of vigilance and alertness which will make his eyes, hands and nerves more perfect servants at all times.

And when we do take up the specific question of fog protection we cannot fail to see that, rationally, the precautions should come before the stop signal is reached, and not after. Every additional device or regulation ought to aid the engineman in carrying out his main rule, which is to never run a single foot beyond a home signal at danger. To put a torpedo machine at the distant signal is, indeed, looked upon as unwarrantably troublesome and wasteful, because it will annoy trains which do not need it, and thousands of torpedoes will be used up in fair weather. In the Fourth Avenue tunnel the machine is at the home signal, and the flagman on the train is depended upon to provide for the rare cases where a train needs protection just beyond the home signal. In the tunnel a condition about the same as fog must be assumed to exist at all times, and this appears to have been decisive in the selection of the home signal as the place for the audible signal. But where the normal condition is daylight, with fair skies, it would be possible to have the torpedo machine disconnected at all times except when the view is obscured. The liability that a signalman might neglect to reconnect it when a fog came on should be no greater than the liability that a fogman would be dilatory or forgetful, or that a night signalman might forget to call him. With the machine disconnected nine-tenths of the time, the objection to placing it at the distant signal is reduced to a small factor.

We have discussed torpedoes because all railroad men, and especially our English cousins, are supposed to be powerfully predisposed in their favor, as compared with other audible signals; but it is not fair to mention the Fourth Avenue Tunnel without referring to the large gongs which are fixed, about 10 ft. above the ground, alongside of each torpedo and home signal, and which are sounded by mechanical means when a train runs past the horizontal semaphore. A gong possesses obvious advantages over torpedoes, and its disadvantages are certainly not to be regarded as insurmountable. As at present used, both gong and torpedo labor under the disadvantage that the absence of a sound (which may result from breakage of connections) means "all-right"; but we are probably safe in saying that the bell can get around this difficulty, whenever signal engineers shall make the demand, better than the torpedo can.

Compound Locomotives Built in the Uuited States.

In the last edition of "Modern Locomotives," a table was published of the total number of compound locomotives built by the principal locomotive works in this country up to October, 1896. This table is now reproduced and a column is added giving the total number of compounds built up to April, 1900. It will be seen that in about three and one-half years the number of compound locomotives has been more than doubled and the table shows that the use of compound locomotives is growing fast. In addition to these engines, the Atchison, Topeka & Santa Fe has during this time built five four-cylinder tandem compounds for freight and two for passenger service. These were built in the company's shops at Topeka.

Compound Locomotives Built in the United States.

Name of Builder.	Type.	Total number compound locomotives built Oct. 1896.	up to April 1900.
Baldwin Locomotive Works	Vauclain 4-cylinder	700	1,319
	2-cylinder	....	10
Brooks Locomotive Works	4-cylinder tandem	2	2
	2-cylinder	2	2
Rogers Locomotive Co	2-cylinder	10	10
*Richmond Locomotive & Machine Works	2-cylinder	31	153
†Rhode Island Locomotive Works	2-cylinder	81	95
	4-cylinder	8	12
Pittsburgh Locomotive & Car Works	2-cylinder	20	42
Cooke Locomotive & Machine Co	2-cylinder	1	2
Schenectady Locomotive Works	2-cylinder	75	249
Total		930	1,896

*Built and converted.
†Now the International Power Co.

The Southern Pacific has announced that it will abandon the project of establishing a relief department for the benefit of the employes of the road. This action appears to have been due to the strenuous objections of some of the employes in and near San Francisco who profess to believe that the company was trying to deceive them; that it intended at some future time to make membership in the relief department compulsory as regards old employes. A grievance committee of 57 members was appointed to confer with the President, Vice-President and managers (though it appears that only 20 of the 57 attended the conference), and the subject was discussed in a friendly manner; but the employes could not shake off their scare. President Huntington told them that the company's motive was wholly unselfish and that therefore the scheme would not be pressed; but it would be laid on a shelf whence, Mr. Huntington thought, the employes would some day ask to have it taken down and adopted. From this distance it looks as though the sensational newspapers had been a considerable factor in working up sentiment against the proposed relief plan.

NEW PUBLICATIONS.

Railroad Operations. How to Know Them From Study of the Accounts and Statistics. By J. Shirley Eaton. New York: The Railroad Gazette, 1900. Price $2.

This book, of about 300 pages, is written by a man whose training has been for some years in the accounting departments of several large lines, and who is thoroughly familiar with statistics, what they mean and what they do not mean. The chapters are, Hints for Examining Railroad Property; Watching Freight Traffic Currently; Watching Expenses; Watching Passenger Traffic Currently; Reducing Expenses; and a series of chapters discussing in detail the classification of expenses by the Interstate Commerce Commission, concluding with short chapters on Capital, Earnings and Expenses, and the fundamental theory of a railroad.

But little has appeared in this field of examination of railroad operations and Mr. Eaton's book would seem to be in demand not only by statisticians and accountants but also by intelligent security holders and all students of railroad operations. The subject is so handled as to impress the reader with the importance of putting a proper interpretation on railroad statistics and the writer seems to have about the right idea of what the interpretation should be. He is well grounded in the most advanced ideas of working and accounting. For instance, he says that the train-mile is taken as the great unit of operating expenses; road maintenance should be examined per mile of road through a series of years; mileage per car per day is an index to good or bad management. It has taken a great many years for some managers to find out these facts.

Speaking of freight traffic, he says that practically local business is so little affected by the rate that an arbitrary tariff is generally imposed which is so seldom changed that it is called specific. In many instances such has been the history of local business and local tariffs, but I am not prepared to say that it is quite so fixed as formerly. The competition of markets has necessitated careful watching of local tariffs. Mr. Eaton says: "The meaning of the figures must be brought home to every official and employe, however humble, who in any way or part can affect the conditions that control the tariff. This is generally the point where traffic statistics fail and how they are brought into contempt." On this point it may be said that the success that one of the newer General Managers out of Chicago is making over his predecessor and in comparison with the previous record of his large system, is that he insists that the working of each Division Superintendent on the entire system shall be laid before every other Division Superintendent. Before adverse criticism is made on results, comparatively stated, all allowance is taken for the different local conditions, but it is surprising to see the great progress a few months of this comparative study has made in some items on all divisions. "Not only it is important that every department be alert to discover new methods, but they must further discriminate and bring them forward in their order of relative economy."

In speaking of too great elaboration of statistics, the writer well says: "It is common to express the motive power cost per car-mile, as fuel, engineers and firemen, water supply, oil and other supplies. Such items throughout would be simply the cost originally shown by the engine-mile, divided by the average number of cars per train," and he likens this to a market woman who would itemize her cost for harness, horse feed, etc., per head of cabbage that she should sell.

The chapters on Interstate Commerce Classification are comprehensive and complete. No two people would possibly draw the same conclusions from these items, but the views of the writer are well expressed and consistent. He states that "The real purpose of a public report is to make a general exhibit of railroad operations as a whole in the territory under review. It should bring into outline the relations sustained to the public and the efficiency of the service." This is another statement that it has required a good many people a good many years to find out.

The discussion of the ton-mile is very elaborate, but while worth careful study the point is brought out that the ton-mile as a unit for service has a different value for each use served. While this is no doubt so, it is doubtful if it is an important point, because it is the basis of estimating revenue and expenses and not the service that is under consideration. The author gives an elaborate table from Mr. F. W. Johnstone, of the Mexican Central, on the locomotive performance until, which to me is new and I am not prepared to say without value, but the question naturally arises if, with all the deductions and estimates that are necessary to frame such a table, there is not danger of approximating so much as to lose a good deal of the value of the result.

Speaking of pro-rating, the author states that the tendency is constantly toward a larger and larger body of undistributed costs on every road. Here he has shown that he does not lose sight of the limitation of statistics. He says that undoubtedly the ton-mile is the best single unit that has so far been offered, but its value must always be qualified by the other elements that enter with it.

In speaking of the methods of the tabulation of railroad working, he indicates the cartographic method and illustrates certain methods practised by the Southern Pacific which are quite clear, but so far as I am aware nobody has perfected this method quite so fully as is done in the Commissioners' reports of the New South Wales Government railroads. By the use of diagrams it is readily seen therein what has been the tendency of each item under consideration and the sum of two or more items is carried forward in an interesting way.

The closing chapter on the fundamental history of the railroad is well worth a careful reading, and it might have been better to put this chapter in the beginning of the book.

It has not been possible to call attention to numerous other points well discussed in the book. In a few instances the idea of the author is somewhat difficult to understand on account of his method of writing in an interrogative way, but when the style is once grasped it is quite clear.

This book should find, comparatively speaking, a large number of readers, and I am prepared to say that I know of no book which treats the subjects quite as concisely and intelligently. There was a pamphlet published some five years ago, entitled "The Anatomy of the Railroad Report," by Thos. F. Woodlock, United States Book Co., which might profitably be read in connection with this book. That pamphlet deals with the balance sheet, while Mr. Eaton's book gives attention more specifically to expense accounts.

G. B. L.

Dynamometers and the Measurement of Power: A Treatise on the Construction and Application of Dynamometers. With a description of the methods and apparatus employed in measuring water and electric power. By J. J. Flather, Professor of Mechanical Engineering in University of Minnesota, Minneapolis, Minn. ix + 394 pages. 12mo, cloth, 113 cuts; index. New York: John Wiley & Sons. Price, $3.

Prof. Flather has now issued a second edition of his little book on Dynamometers, the first edition of which was published in 1892. This new edition is considerably enlarged. Four chapters are added on the measurement of electrical power and another new chapter, of especial interest and value, is on the power required to drive machinery. The author has tabulated in this chapter the results of numerous experiments made upon machines of various kinds, working under different conditions, with a view to ascertain the horse power actually delivered to the machines in working. This tabulation fills 50 pages of his book and includes a great variety of machines doing quite different services and hav-

ing quite different capacities. Experiments on groups of machines are also here noted. In this table are collected many tests made by the author and also results obtained by Hartig, Vauclain, Halsey, Pike, Dodge, Crocker, Cox, Wise, Banjamin, Carlsen and Lemon. In the tests made by Dr. Hartig 69 separate machines were operated through a recording transmission-dynamometer and from five to 50 tests were made on each machine, and the horse power required to drive the machine idle as well as under load was carefully determined. Messrs. Carlsen and Lemon experimented on over 120 machines or groups. These facts indicate the scope of the table.

The older portion of the volume is probably well known to those of our readers who are interested in such subjects. It covers the theory and practice of friction brakes, absorption and transmission dynamometers and the measurement of water power, and the volume, as a whole, is a convenient and useful manual.

Rand, McNally & Co.'s Enlarged Business Atlas and Shippers' Guide. Thirteenth Edition, revised and enlarged. Chicago, 1900.

This important work of reference comes to us with its usual annual revisions and is in no way behind the high standard set by preceding editions. It has 429 pages (14 in. x 20½ in.) in which the information is exceedingly easy of access. The maps are clear, reasonably accurate and unencumbered by unnecessary detail and with indexes carefully made and readily accessible, it is easy to locate places however obscure. Particular attention is given to locating the railroads accurately and fully. As to new roads, the work is apparently well up to date. The railroad features alone make the book of extreme value. We have followed the editions year by year and rarely find them misleading or essentially inaccurate. All this is true of the United States, Canada and to a less extent of Mexico. With the rapid development of Mexico, maps in fuller detail would be a decided advantage. A new feature this year is the extending of the system of railroad designation to the islands of Cuba and Puerto Rico. Outside of our own continent the maps are meager and furnish practically no indications of railroads.

TRADE CATALOQUES.

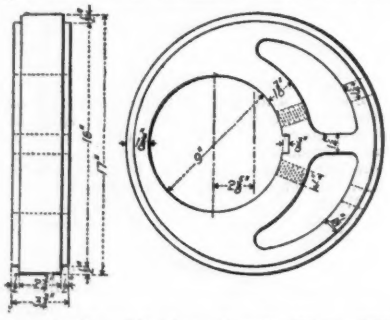
Macleod & Clark, 457 to 463 E. Front Street, Cincinnati, O., have issued a new catalogue describing various specialties used on railroads. The Buckeye portable torch light is illustrated as used for lighting where work is carried on at night in isolated places. It can also be modified so as to be used for expanding the tires of locomotive drivers without removing the wheels. Other specialties are oil fuel heaters, pulsating pumps, centrifugal pumps, hot air engines, paint spraying machines and other compressed air appliances.

The Solid Steel Tool Co., Chicago, has issued a catalogue of railroad track tools, including chisels, picks, bars, hammers and mauls, rail tongs, track wrenches and rail benders. The catalogue contains engravings of standard designs, but special tools will be made from samples or drawings when desired.

Shop Notes from the New York Central.

In our issue of Feb. 16 we described the Depew shops of the New York Central & Hudson River Railroad. Through the courtesy of officers of the road we now give some further matters from the same shops.

The tube-heating furnaces, to which reference has already been made, were designed by the boilermaker in charge of the Depew works. There are two furnaces in the tube-welding department arranged to burn gas coke. The furnace consists of two parts separated by the grate. The lower portion is made of 3/16-in. tank steel and forms an air and ash box. Access is gained to this portion through a door measuring 21 in. by 10 in. that can be closed so as to form a tight joint. The blast is brought into this box through a 3-in. pipe. The size of the box is such that the direct force of the blast is somewhat dissipated and there is a steady and uniform movement of the air up through the grates. The upper portion is lined with fire brick, the limits of the inner surfaces being on the lines marked "Firebox" and on the dotted lines enclosing the Air and Ash Box. At a height of 13 in. above the grates there is an opening, A, measuring 5 in. by 9 in. to admit the flues. The method of operation is the same as in a bolt heating furnace; the flues are put in consecutively and welded as they become heated. The fire is fed through the coke scoop shown at the left of the side elevation. The work of this furnace is very satisfactory. It not only heats the ends of the tubes as rapidly as the welding machine can take care of them, but does the work with great uniformity.

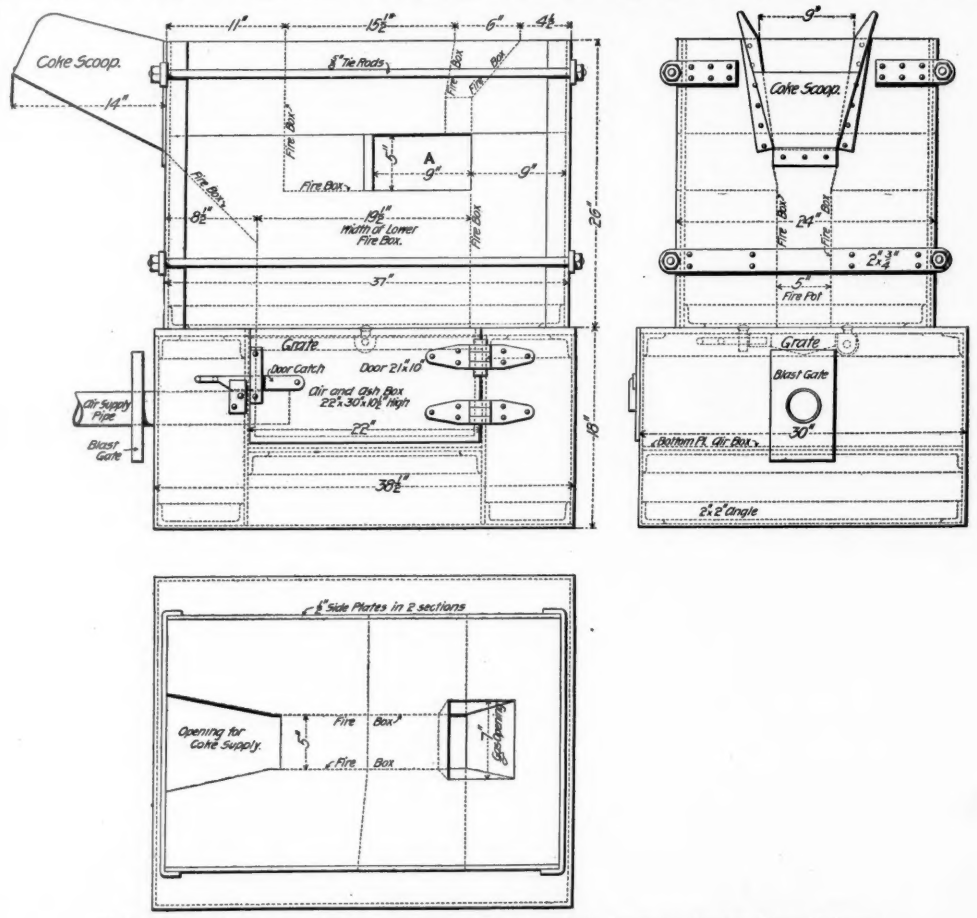


Standard 9 x 11¾ in. Driving Box—N. Y. C. & H. R. RR.

The standard eccentric, for Class I engines, was adopted in 1893 and is simple and cheaply made. The total thickness is 3¾ in., with a wearing face of 2¾ in. The bore for the axle is 9 in., and the outside diameter of the wearing face is 17 in., with a throw of 5¼ in. The eccentric is keyed to the axle by a shallow key held in position by a teat setting in a hole in the axle as described in the previous article. This eccentric is also held by two set screws that are put in through holes in the face.

Eccentric, Class I Engines, New York Central RR.

The latest form of driving box bears the date of last December and the one shown in the engraving is intended for use on the heavy engines with axles 9 in. in diameter. This box is faced on the outside with a brass plate ½ in. thick to protect it from wear, and also to lessen the wear on the inside of the hub of the driving wheel. The design also answers the question recently asked by the committee on journal bearings of the Master Mechanics' Association as to what is considered the best method of locating oil holes and oil grooves in driving boxes. An examination of this engraving will show that there is an oil pocket milled into the face of the crown brass 3½ in. down on either side from the center. This, for a 9-in. journal, will place the oil pocket at an angle of 45 degrees from the top. The oil grooves run diagonally across the crown of the box, uniting the opposite ends of the pockets. The oil holes are ¾ in. in diameter and strike the journal ⅝ in. from the top. Smaller holes ⅜ in. in diameter carry oil down to the pockets. Beyond these details, the construction of the box is clearly shown by the illustration. On the Hudson River Division, where the curves are sharp and frequent, a modification is made so as to allow a play of 3/16 in. in the forward driving boxes. The dimensions given on the engraving allow ⅛ in. play on each side.



Flue Welding Furnace at the Depew Shops of the New York Central & Hudson River Railroad.

An Argument for State Ownership.*

Committees of the Massachusetts Legislature have held numerous hearings at which were presented the arguments for and against the bill approving the lease of the Boston & Albany to the New York Central. One of the principal speakers in opposition to the bill was Dr. E. W. Bemis, who made an argument in favor of disapproval of the lease and the purchase of the road by the state. Under the charters granted for the construction of the Boston & Worcester and the Western roads, and also under the provisions of the legislation which authorized the consolidation of these two companies into the Bosin & Albany in 1867, the State has the right to buy the property at any time by paying an amount equal to its cost, with annual profits of 10 per cent. It is estimated that under this provision the state would have to pay at the present time only about 25 or 30 millions, at which price the stockholders would receive for their shares only about their par value, though the present market value is 240 or thereabouts. Dr. Bemis spoke in part as follows:

A great reason for state purchase is the financial advantage. Even under the Attorney-General's interpretation the state could undoubtedly get the road for far less tha nthe existing market price of its stock, which is perhaps $250 per share, or $62,500,000. According to most interpretations of the charter of the road, it could be bought by the state for about par, or $25,000,000 and the outstanding bonds; possibly $30,000,000 would be needed. During the past seven years the road has not only paid 8 per cent. dividends on $25,000,000 of stock, but out of its earnings it has spent nearly 4 per cent. more in improvements, such as new depots, third and fourth tracks out of Boston, larger rails, better grading and rolling stock, automatic couplers and power brakes for freight cars, the depression of the tracks at great cost in New-

*Previous articles on the Boston & Albany lease and the relations of the road to the state may be found in the Railroad Gazette of 1899, pages 562, 568, 589, 620, 694, 730 and 820.

ton, and in many other ways which are usually paid for out of the new stock and bond issues.

Since the state can borrow at 3 per cent. and would find 2 per cent. ample for a sinking fund, it might readily reduce its charges on both freight and passenger traffic 20 per cent., while in about 30 years the road would be paid for and no fixed charges would any longer be necessary.

Evidently there is great opportunity for a large reduction in charges. All business would be immensely stimulated thereby. State purchase would give the reduction without loss to the purchaser, but it is said that even if the road is leased the state can order some reduction in rates. There will, however, be great limitations to this power.

First, the state, as we have seen, need not derive more than 5 per cent. revenue, and after a time, when the road is paid for, need not derive any profits. Private stockholders will naturally expect 6 or 7 per cent., and they will manage in some way or other to conceal still further profits in various ways.

Second, the state has no power to reduce rates on interstate commerce while the road is in private hands, and has no power to make such reductions even on local rates as will throw on to interstate traffic any considerably larger burden than now of the fixed charges. Under state ownership this difficulty would entirely disappear.

Third, if the Legislature now ratifies the lease it practically declares that according to its present opinion, it is reasonable for this road to earn for 99 years a profit such as will make it worth while for the New York Central to assume the burdens of management and guarantee to the stockholders 8 per cent. dividends and 3½ per cent. on $5,500,000 of bonds nominally issued for the purchase of certain unused assets of the road. This is equivalent to nearly ¾ per cent. dividend on the $25,000,000 of stock.

Whatever may be the technical legal safeguards introduced into the lease reserving to the state its existing rights of regulation and purchase, it is certain that a large number of people will invest in the stock with the feeling that the state will hardly venture within the next 25 years at least to reduce that stock below the valuation put upon it by the lease. A new vested interest in preserving the present exorbitant monopoly charge will arise. Vanderbilt, Rockefeller and other directors of the New York Central, with their vast affiliated interests, will add their persuasive and all-pervading influence to that now exerted by our local road over Legislatures and public opinion.

A second great reason for purchase, and one altogether too little understood, is the importance of doing away with discriminations between large and small shippers. Under public ownership there could be the same charge, whether a man shipped one car or 100 a year. To-day in Massachusetts not only does the shipper of car-load lots get much lower rates, often amounting to only half as much as is asked of the shipper of less than car-load quantities, but it is the belief of Mr. Crafts, who has been clerk of the Railroad Commission since 1868, that even the shipper of car-load lots does not get as low rates over the Boston & Albany and other Massachusetts roads as does the shipper of a larger number of cars yearly. In fact, he says that no shipper can learn what discriminations his rival is enjoying.

It is very remarkable that the Railroad Commission in its reply last week to the questions of the Legislature admits that the published rates are not followed at all by large shippers on the Boston & Albany, and that the discounts from a single station recently examined were found to average 40 per cent. below the published schedule; but nevertheless this Commission treats the matter in such a confused way as to seem to be attempting to give the utterly false impression that these discounts from the published rates are not at all a matter of secret dicker, and that every shipper gets the same rates as every other who sends an equal quantity of freight.

Mr. Bemis referred to the testimony given before the Interstate Commerce Commission in 1898 relative to alleged discriminations on the Boston & Albany in favor of the Standard Oil Company, and read a letter from Mr. Prouty, of the Interstate Commerce Commission, stating that the shipments were entirely to points within the state of Massachusetts, so that the Commission had no jurisdiction. It is needless to say that these secret discriminations of the Boston & Albany are subversive of all equality of opportunity and fair play. . . .

Mr. Bemis met the objection that purchase at par would be confiscation by pointing out that the state's reserved rights under the charter had been frequently printed in the annual reports of the road, and that President Chester W. Chapin in 1872 mentioned the cheerfulness with which money had been advanced by stockholders "and that, too, with a full knowledge of the reserved rights of the state," thus indicating that stockholders have invested in full knowledge of these rights. In further objection to state purchase, continued the speaker, the counsel of the road urges that under public operation Massachusetts would be restricted and hampered, "as a state must be by the indisposition of every one to enter into business arrangements which are subject to publicity and examination of rivals in business." This is a beautiful confession of the lack of publicity and of the secret discriminations now enjoyed by big shippers.

TECHNICAL.

Manufacturing and Business.

The Berlin Iron Bridge Co., of East Berlin, Conn., on May 1 will remove its New York office to the St. Paul Building, 220 Broadway. Seymour N. Robinson will continue to represent the company, in charge of the New York office.

The Pyle-National Headlight Co., Chicago, will send this week to the Richmond Locomotive Works an electric headlight, No. 1,000, which will be put on the famous "Tramp" compound. This engine will be exhibited by the builders at the Paris Exposition.

Universal bearings, made by the Universal Car Bearing Co., of Chicago, will be used on 300 steel cars of 100,000 lbs. capacity recently ordered by the American Steel & Wire Co. from the Pressed Steel Car Co., and also on the 250 80,000-lb. coal cars ordered by the Chicago & Eastern Illinois from the Mt. Vernon Car Mfg. Co.

The Solid Steel Tool Co. has recently been organized at Chicago to make a full line of railroad track tools. H. H. Miner is President and Treasurer and W. D. La Parle Manager and Secretary. The offices are at 64-66 South Clinton Street, Chicago, and the works at South Chicago.

The pressed wheel department of Roberts, Throp & Co., Three Rivers, Mich., was completely destroyed by fire on the morning of March 27. The building has now been replaced and new machinery added which doubles the capacity for making hand and push cars and railroad velocipedes, and the plant is running as before. The Cyrus Roberts heirs having acquired the interests formerly held by other parties, the company has been reorganized and the name changed to the Roberts Car & Wheel Co., it being thought best that the business should be indicated by the name of the company. W. H. Frisby will continue as General Representative in charge of the sales department.

Iron and Steel.

The Standard Chain Co., Pittsburgh, Pa., has bought the chain plant of the American Steel & Wire Co. located at Cleveland, O., which was formerly operated by H. P. Nail & Co.

Wm. Barrett Ridgeley of Springfield, Ill., has been elected Secretary of the Republic Iron & Steel Co., with office at Chicago, Ill., succeeding S. J. Llewellyn, recently resigned.

Canadian reports state that the Cramps of Philadelphia are interested in the project, referred to last week, for a steel plant which is to include shipbuilding works, to be located in Collingwood, Ont., on Georgiana Bay.

The weekly capacity of pig iron furnaces in blast on April 1 was 289,482 gross tons, compared with 292,643 tons on March 1, and 298,014 tons on Feb. 1. Furnace stocks were 192,532 tons on April 1, as compared with 185,152 on March 1. It had been expected, as Iron Age points out, that manufacturers' reports would show not only an increase in production, but a heavy increase of the stocks at the furnaces. The complete statistics, however, show that the weekly capacity of the furnaces in operation on April 1 was 3,161 tons less than on March 1. This is largely due to the irregularity of furnace operations during March, owing to the scarcity of coke, and in some sections to difficulty in securing a sufficient supply of ore.

Frank C. Roberts & Co., civil engineers, Philadelphia, Pa., are engineers for the following works: Two furnaces for Laughlin & Co., Ltd., Pittsburgh, Pa., 22 x 100 ft.; also one furnace each for the National Tube Co., Wheeling, W. Va.; the Warwick Iron & Steel Co., Pottstown, Pa.; Joseph Wharton, Port Oram, N. J., and for the Pennsylvania Furnace Co., Sheridan, Pa., each to be 21 x 100 ft.; a furnace for the Dunbar Furnace Co., Dunbar, Pa., 18 ft. 6 in. x 75 ft., and one for the Lowmoor Iron Co., Lowmoor, Va., 20 x 80 ft. The first dimension given above is the diameter of the bosh of the furnace, and the second dimension in each case is the height of the furnace. The company is also making plans for improvements to the following furnaces: Lebanon Furnace, Lebanon, Pa.; Saxton Iron Co., Saxton, Pa.; Covington furnace, Lowmoor, Iron Co., Lowmoor, Va., and the Hamilton Iron & Steel Co., Hamilton, Ont.

Louis F. Grammer, Superintendent of the Lackawanna Iron & Steel Co., at Lebanon, Pa., has resigned to assume similar duties with the American Steel & Wire Co., at Cleveland, O. The change will take effect May 1.

Twelve mills of the American Steel & Wire Co. shut down April 15 at the following places: Pittsburgh, Cleveland, Joliet, New Castle, Pa.; Anderson, Ind.; Waukegan, Ill., and De Kalb, Ill. The daily production of the 12 mills is between 3,000 and 4,000 tons.

There are inquiries in the market, according to local mill agents, for more than 12,000 tons of rails for various foreign countries. Early delivery is wanted for Argentine, Mexico, Japan and Australia.

At a meeting of the directors of the Carnegie Steel Co. at Pittsburgh, April 16, three assistants to the President were elected. They are Charles L. Taylor, John McLeod and H. Tener, Jr. One will superintend the department of mines and metals, another the departments of sales and the third the disbursing department.

Ventilation of the Hoosac Tunnel.

We noted last summer the fact that an experimental ventilating plant had been put in service at the Hoosac Tunnel. It consists of an 18-ft. fan, at the top of the central shaft, run by electricity. This fan has not been run during the winter as the doors at the west portal have been closed. Observations were begun again on the second of this month, but the information obtained up to this time is not enough to justify definite conclusions. The impression of the Chief Engineer now is that an apparatus will be needed which can handle a greater quantity of air. The present arrangement improves the conditions, but does not entirely remove the smoke.

Nickel-Steel Forgings.

The Bethlehem Steel Company report an increase in the number of railroads either experimenting with locomotive forgings made of Bethlehem nickel steel or ordering them in lots ranging from 25 to 150 pieces. The demand covers axles, piston rods and crank pins, and among the roads using these forgings are the Atlantic Coast Line, Baltimore & Ohio, C., C., C. & St. Louis, Canadian Pacific, Chicago Great Western, Chicago, Milwaukee & St. Paul, Denver & Rio Grande, Grand Trunk, Lehigh Valley, Northern Pacific, Wabash, etc. The Baldwin, Richmond, Rome and Schenectady Locomotive Works have also placed orders.

Rapid Transit in New York.

Some of the contracts for the new rapid transit railroad in New York were let on Monday. The Carnegie Steel Company gets the contract for the structural steel for the subway and for the viaduct and elevated structures. The bid is for 72,945 tons. The Sicilian Asphalt Paving Co. gets the contract for 775,795 sq. yds. of waterproof and the United Building Material Co. of Philadelphia gets the contract for 489,122 cu. yds. of Portland and natural cement. The contractors for the construction of various sections, so far as now announced, are the Degnon-McLean Construction Co., 1 Broadway, New York; E. J. Farrell, Hamilton Bank Building, New York; John C. Rodgers, 151st St. and Harlem River; John Shields, Flemington, N. J., and L. B. McCabe, Baltimore, Md.

Applied Electricity at Paris.

M. Marcel Delmas, 10 Boulevard Emile Augier, Paris-Passy, has charge of the report of the Congres de Mécanique de l'Exposition Universelle, in the department of applications of electricity to the various apparatus of haulage, hoisting, etc. (including cranes, elevators, winches, swing bridges, pumps and other such mechanisms), and particularly desires information regarding the economic side of the matter. He requests that all, whether intending exhibitors or others, who are willing to assist in the collection of this data, send him, at the address given above, statements of costs of installations, of exploitation and incidental expenses; especially where a comparison can be made with costs of the older systems under similar circumstances. All publications and illustrations will be welcome, if authentic and exact in statement of facts and data.

Steel Ties in Mexico.

The Mexican Southern Railroad (3 ft. gage) has now about 140 miles, or almost two-thirds of its main line, laid with steel ties. The management is well satisfied with these ties, especially with the comparative cheapness of maintenance. The company may buy more steel ties in the future, but probably will not until steel becomes cheaper.

Electricity on the London "Underground."

The experimental electrical section of the Metropolitan and Metropolitan District Railways was inspected by the directors on April 3. The Board of Trade inspection took place the following day. The company has just placed before its shareholders for consideration its new Parliamentary bill seeking powers to equip generating stations at Lot's Road, Chelsea, for supplying electrical energy to the whole railroad after the experiments have been satisfactorily concluded.

The Central London Railway Company does not expect to open its line to the public until June. The position of affairs seems to be that the railroad, including trains, lines, tunnels, generating station, etc., is all complete, but the electric lifts for taking passengers down to it are causing the delay. That is what is stated, anyhow.

The New Works of the Berlin Iron Bridge Co.

The Berlin Iron Bridge Co. of East Berlin, Conn., has bought 50 acres of land between the Pennsylvania RR. and the Ohio River at Pittsburgh, Pa., for its new works; also 50 acres in addition back from the river. Upon the latter a number of houses for employes will be built. The foundations for the buildings of the new plant are now being put in and it is the intention to have the plant in operation by July 1. The order for the machinery equipment was placed some months ago. The office building will be 60 ft. square and four stories high, of fireproof construction. The main shop will be of steel and glass and will be 220 ft. wide and 700 ft. long. The orders for the machinery have been placed with the Hilles & Jones Co. of Wilmington, Del., the Cleveland Punch & Shear Works of Cleveland, O., the Niles Tool Works Co. of Hamilton, O., and the Brown Hoisting & Conveying Machine Co. of Cleveland, O. The hydraulic plant will be furnished by Wm. H. Wood of Media, Pa. The floor surface of the main shop will be controlled by 23 traveling

cranes of various sizes and designs, furnished by the Chisholm & Moore Mfg. Co. of Cleveland, O. The fuel will be natural gas, the engines being furnished by the National Meter Co. of New York. The machinery will be operated by electric generators and motors furnished by the General Electric and the Westinghouse companies. Contracts are now being taken for delivery after July 1. The capacity will be from 3,000 to 4,000 tons per month.

THE SCRAP HEAP.

Notes.

The Supreme Court of Alabama has decided the case of a street railway company which enforced a rule that whites and negroes should occupy the separate portions of a car set apart for them. A negro woman was put off the car for refusing to obey the order and she sued for damages. The lower court decided in favor of the railroad and the Supreme Court has affirmed the decision.

A press despatch from Montreal says that after several conferences between the Dominion government and representatives of the telegraphers' organization, the Government has decided to redress the grievances of the telegraphers employed on the government-controlled Intercolonial Railway. The men will get fifteen days' holiday annually with pay, and the Telegraphers' Union will be recognized by the road.

The Commerce Committee of the Senate has held further hearings on the Cullom bill to amend the Interstate Commerce law. Joseph Nimmo, Jr., and George R. Blanchard appeared in opposition to the bill, and Commissioner Prouty presented an argument in its favor. At one of the hearings Senator Chandler made minute and critical inquiries concerning the action of the Interstate Commerce Commission in sending letters to many hundred boards of trade and other commercial organizations suggesting that more active measures be taken to secure action by Congress on the Cullom bill.

Judge Thayer, in the United States Circuit Court at St. Louis, sitting in Chambers, has decided that the Burlington road had no right to refuse to receive at Council Bluffs from the Omaha & St. Louis a car of agricultural implements from Chicago bound for Campbell, Neb. It appears that there was no question of through rates involved, the O. & St. L. being willing to have the car go through at local rates from Council Bluffs. After once refusing the goods the Burlington offered to receive them if they were transferred into one of its own cars, but the goods had been packed by an expert and it is said that transferring was out of the question. According to the newspaper reports the court largely neutralized the value of its decision (to the O. & St. L.) by stipulating that the Burlington should not be required to pay anything for the use of the O. & St. L. car.

On April 12 the Brotherhood of Railway Telegraphers ordered a strike throughout the lines of the Southern Railway; and for several days the newspapers contained long despatches purporting to tell of the disturbance of business on the lines of this company. Simultaneously with these were published statements of the officers of the road that little or no trouble has occurred. So far as it is possible to form an opinion from the published statements it appears that the strike amounted to very little. Not more than a tenth of the telegraph operators employed by the road left their places, and on some divisions there were no strikers at all. The officers of the road deny the allegations of the strike leaders that passenger trains were delayed by lack of operators, and we find nothing but the assertion of the strike leaders to support the statement that freight trains have been badly tied up. There were reports that at some small towns new men, taking the place of strikers, were unable to get board and lodgings, and were virtually driven out of town. Officers of the road stated that at a number of places wires had been maliciously cut, interfering with the running of trains. By Saturday, April 14, the officers of the road at Atlanta said that all trouble in handling trains was over, and that the amount of freight being moved by the road was larger than on the corresponding day of last year.

Proposed Railroad in the Azores.

Contracts are to be let soon, according to U. S. Consul at St. Michael's, for a narrow gage railroad to connect that city with Riberia Grande, and Furnas, a local resort noted for its hot springs. It is estimated that the total population served by the road will be over 60,000, and that the gross earnings for the first years will average 90,000 milreis (about $97,000), of which 50,000 milreis will be for passengers.

Grand Rapids & Indiana Bridges and Buildings.

The annual report of the Grand Rapids & Indiana Ry. states that repairs to and rebuilding of bridges and culverts during the year 1899 cost $52,921, an increase over the previous year of $17,272. Early in 1899 a contract was let for a steel bridge with masonry substructure over Kalamazoo River near Plainwell, Mich. The masonry was completed in time, but owing to the inability of the bridge contractors to obtain steel, the superstructure had not been erected at the close of the year. The total cost of the bridge is $19,615. The bridge on Tioga spur, crossing Muskegum River at Big Rapids, and 11 other bridges were rebuilt; 12 filled and discontinued; 41 replaced by iron pipe and filled, and 130 repaired. The length of openings filled and piped where necessary was 2,385 ft., at a cost of $8,168.69. The annual saving on openings discontinued, or replaced by permanent structures, excluding interest on the cost of the work, is estimated at $4,600. This does not include the saving by construction of the new Rogue River line, reported in 1898. The net reduction in openings due to abandonment of seven bridges on old line, 1,004 ft., less the length of one bridge on new line, 125 ft., is 879 ft. The cost of repairs of wooden bridges and trestles was $22,442. Of this $11,500 was due to the necessity of strengthening various structures to ensure safety in carrying heavy equipment.

Funds have been appropriated for a new passenger station at Cadillac and LaGrange, and moving and remodeling the old station buildings at these points for freight purposes at a total estimated cost of $19,261. The passenger station at Petoskey, which was damaged by fire, must shortly be replaced by a new structure.

A Great Coal District.

The Prussian Minister of Public Works, in a speech before the Diet, claimed that freight traffic in the Ruhr coal district (near Düsseldorf) is the densest in the world. Last year 16,000 coal cars daily were taken in and out and on many days nearly 17,000 These cars generally carry 33,000 lbs. In addition at least 4,000 other freight cars were required daily. As it takes about 100 miles of track to hold 20,000 cars, and as the 20,000 must go in as well as come out daily, and the district is of limited extent, it was evident that the railroads might be crowded. This district is the great center of iron manufacture, and one of the two great coal producing districts of Germany.

Open Hearth Steel Output in 1899.

The production of open-hearth steel in the United States in 1899, as ascertained by the American Iron and Steel Association, was 2,947,316 gross tons, against 2,230,292 tons in 1898. In 1898 the production of open-hearth steel by the basic process amounted to 1,569,412 tons and by the acid process to 660,880 tons. Of the total production last year 2,080,426 tons were made by the basic process and 866,890 tons were made by the acid process. The total production open-hearth direct steel castings in 1899, included above, amounted to 169,729 gross tons, of which 39,689 tons were made by the basic process and 130,040 tons were made by the acid process. In 1898 the production amounted to 120,537 tons, of which 28,460 tons were made by the basic process and 92,127 tons by the acid process. Great Britain produced 3,030,250 tons of open-hearth steel in 1899.

Railroad Men and the Paris Fair.

Mr. L. F. Loree, General Manager of the Pennsylvania Lines West of Pittsburgh, is a delegate to the International Railway Congress in Paris next September. He is President of the American Railway Association and will, of course, represent that body. Mr. J. F. Wallace, Assistant 2d Vice-President of the Illinois Central and President of the American Society of Civil Engineers, is a delegate to the Congress on Tests of Materials. Mr. Joseph Ramsey, Jr., Vice-President and General Manager of the Wabash, will represent the United States Government at the International Railway Congress, and is also a delegate to the same Congress from the American Railway Association. Dr. C. B. Dudley, Chemist of the Pennsylvania RR., is a delegate to the Congress on Chemistry. Mr. W. Renshaw, Superintendent of Machinery of the Illinois Central and Mr. A. E. Mitchell, Superintendent of Motive Power of the Erie, are Jurors in the International Jury of Awards, Group VI, Class 32, Transportation, etc. They will spend the month of June in Paris. Mr. Albert L. Colby, Metallurgical Engineer of the Bethlehem Steel Co., and Secretary of the American Association of Steel Manufacturers, will represent that Association at the International Congress for Testing Materials of Construction, to be held in Paris in July. Mr. Colby is also a Juror in Group II, Class 64, Department of Metallurgy. The work of the juries will be done in Paris in June.

Chicago Tunnels.

The Southwest land tunnel connecting the new Central Park Ave. pumping station with the 10-ft. lake tunnel which leads to the Carter H. Harrison crib, has been completed and turned over to the city for inspection. The branch of the work just completed is known as Section 2 of the new tunnel system. It is 8 ft. in diameter and 20,000 ft. long, one-half of its length being carried through solid rock. J. J. Duffy had the contract and work was begun in November, 1895. It has cost the city $940,000 and was paid for from the water fund. The work on the several branches of the new system, including new pumping stations, all of which has been noted from time to time in this column, has so far cost nearly $4,000,000, and considerable work yet remains to be done before the entire system is finished.

The Chicago Star Construction & Dredging Co. notified the city of Chicago on April 10 that it would be unable to finish the work on the Thirty-ninth St. conduit of the intercepting sewer system, for which it had the contract. The same day A. J. Doyle, Jr., was appointed Receiver of the company. Some time ago the company got a verdict against the city for $200,000 for extras on the work, being allowed $20 a ft. increase instead of the $35 a ft. which is claimed. The work so far completed has been well done by the shield system, but 5,000 ft. of the original 12,000 ft. remains to be finished. Owing to the increased cost of materials it will cost the city much more than the original contract price to finish the work. The National Surety Co., which gave a bond of $390,000 for the Chicago Star Construction & Dredging Co., has been notified that the city will hold it liable for the completion of the work.

Stamp Tax on Bills of Lading.

The Supreme Court has decided the cases involving the stamp tax on bills of lading given by express companies, the question being whether the shipper or the carrier shall pay the charge. The opinion is by Justice White, and is favorable to the express companies, the Court declining to compel them to affix the stamps at their own expense. There were two cases before the Court, but the opinion was based on the case of the American Express Company against the Attorney-General of Michigan. The Supreme Court of Michigan decided against the express companies.

The original proceeding consisted of a prayer for a mandamus commanding the company to receive packages for transportation by express and to issue receipts with stamp duly cancelled, without seeking to compel shippers to pay for the stamp. The express company contended that the question as to who should pay for the stamp was one for adjustment between the shipper and the company. Quting the section of the law imposing the tax, Justice White said:

There is nothing in this provision which by the widest conjecture can be construed as expressly forbidding the person upon whom the taxes are cast from shifting the same by contract or by any other lawful means.

The contention in behalf of the shippers, he continued, amounts to saying that the act is not merely one for levying taxes, but is a statute determining that the burden must irrevocably continue to rest on the one on whom it is primarily placed. "The result follows," he said, "that all contracts or acts shifting the burden and which should be otherwise valid become void. To add by implication such a provision to a tax would be contrary to its intent. . . . Unquestionably a carrier is subject to the requirement of reasonable rates, but no question of the unreasonableness of the rates charged arises on this record or is at issue in this cause."

For these reasons and others the decision of the Supreme Court of Michigan was reversed.

The case of the Adams Express Company, coming from the Circuit Court of Appeals for the Second Circuit, was also decided in favor of the company.

Justices Harlan and McKenna dissented from the opinion in the Michigan case on the ground that "the War Revenue act imposed upon the express company the duty not only of affixing at its own expense the required stamp upon any receipt issued by it to a shipper, but of cancelling such stamp."

An Air Drill in Submarine Work.

Naval Constructor Beliankin, of the Russian Navy, writes from the far north about the successful work done with a new Boyer air drill working under water on the sunken battleship Apraxim of the Russian Navy. He says that when drilling through granite and other hard substances, the machine works as well under as it does above water.

Eclipse Excursions.

On May 28 the Southern Railway will offer excursion rates to various points on its lines where the total eclipse of the sun may be seen. The company sagaciously does not reduce its rates below two cents a mile each way, and these rates are given only if passengers will go in parties of 10. Presumably, people who want to see an eclipse will pay two cents a mile just as readily as one cent a mile, and an eclipse is a luxury anyway. We do not see that anybody has a vested right to be carried cheaply to eclipses. It is rumored, however, that the Old Dominion Steamship Company will put in some cheap eclipse rates which may bother the Southern. It is surmised that if the day happens to be cloudy alternative entertainments will be carried on in the dining cars with unsmoked glasses. If the weather is fair, however, the prudent observer will keep out of the dining car until after the eclipse, for at Raleigh, for instance, totality lasts only one minute and 54 seconds, and the man who wants to see the show will have to keep his mind on his business.

Technical Schools.

Massachusetts Institute of Technology.—Recent lectues given by outsiders before the students in this department have been as follows: A lecture by H. G. Prout, Editor of the Railroad Gazette, on the "Future of the Railroad Engineer." Mr. Prout outlined the development of the science of railroading, and called attention to the special fields open to Civil Engineers in which they would find the greatest opportunities in the future in connection with this profession.

Three lectures by Mr. George W. Tillson on the "Construction of City Pavements." Mr. Tillson gave a very instructive and interesting discussion and comparison of the different forms of street pavements.

A lecture by Mr. Morris Knowles on "Experiments on Filtration of Water at Pittsburgh, Pa."

A lecture by Mr. F. H. Newell on the "Hydrographical Works of the U. S. Geological Survey."

LOCOMOTIVE BUILDING.

The Pere Marquette is figuring on buying one switching locomotive.

The Lehigh Valley is having 20 engines built by the Baldwin Locomotive Works.

The Brainerd & Northern Minnesota is reported to have ordered two locomotives from the Richmond Locomotive & Machine Works.

The Baltimore & Ohio is in the market for 12 heavy passenger locomotives, making in all 112 engines the road has under consideration.

The Pittsburgh, Cincinnati, Chicago & St. Louis (Pennsylvania Co.) has ordered two engines from the Pittsburgh Locomotive & Car Works.

The Minneapolis, St. Paul & Sault Ste. Marie is receiving bids on six consolidation locomotives. It is understood the road will order in all 15 locomotives.

The Northern Pacific, we are officially informed, has ordered 20 more locomotives from the Schenectady Locomotive Works to be delivered this season. These are known as class "S 2" engines, of which this road already has many in service.

The St. Louis & San Francisco, as noted last week, has ordered 18 consolidation locomotives from the Dickson Locomotive Works. They will weigh about 155,000 lbs., of which about 140,000 lbs. will be on the drivers. The details have not all been decided.

The Richmond, Fredericksburg & Potomac has ordered two 10-wheel engines from the Richmond Locomotive & Machine Works for July delivery. They will weigh 140,000 lbs., with 102,000 lbs. on the driving wheels, and have 19 in. x 26 in. cylinders; 62-in. driving wheels; straight top boilers with a working steam pressure of 180 lbs. and 267 iron tubes 2 in. in diam. and 14 ft. 5 in. long; fireboxes, 96⅜ in. long and 42 in. wide; and a tank capacity for 4,000 gals.

of water. The specifications call for Westinghouse brakes, open hearth steel axles, Christie brake shoes, Janney couplers, No. 9½ Sellers' injectors, U. S. Metallic piston and valve rod packings, Star safety valves, Leach sanding devices, Detroit lubricators and French springs. No special make of tires is specified.

CAR BUILDING.

The Pullman Co. is building seven cars for its general service.

The Lehigh Valley has ordered 15 steel cars from the Pressed Steel Car Co.

The Miller Refrigerator Line has ordered seven cars from F. M. Pease.

The Chicago & Alton is having 12 cars for passenger service built by the Pullman Co.

The Arizona & New Mexico has ordered 12 coke cars from the American Car & Foundry Co.

The Craig Oil Co., of Toledo, O., has ordered one tank car from the American Car & Foundry Co.

The Yellow Poplar Lumber Co., of Coalgrove, O., has ordered 20 logging cars from the American Car & Foundry Co.

The Chicago & Eastern Illinois has ordered from the American Car & Foundry Co. the 150 coal cars of 80,000 lbs. capacity, referred to March 30.

The Southern is in the market for 10 passenger and 10 baggage cars, and has ordered one more 60-ft. postal car from the American Car & Foundry Co.

The Michigan Central, we are informed officially, is building about 20 furniture cars a month at its own shops, as it has been doing for some time past. Nothing new in the way of car building is being done.

The Delaware, Lackawanna & Western is considering buying a large number of box and coal cars, but the exact number to be ordered and the time for letting contracts have not been decided.

The Kansas City & Oklahoma Construction Co., which has the contract for a part of the Kansas City, Mexico & Orient RR. and other roads, will buy some rolling stock under the direction of the officials of the roads. Wm. C. Edwards, of Kansas City, Mo., is President of the construction company. The New York office of the company is 150 Nassau St.

The Jackson & Sharp Co. has received an order for 110 cars for the Havana (Cuba) electric street railroad.

The Metropolitan Street RR. of Kansas City, Mo., is said to have ordered 50 open cars from the Brownell Car Co.

The Union Traction Co., of Anderson, Ind., is reported to have ordered 25 interurban cars from the St. Louis Car Co.

BRIDGE BUILDING.

ABERDEEN, S. D.—The County Commissioners have let the contract for the bridge for which bids were received April 6 to the Gillette-Herzog Mfg. Co. of Minneapolis, Minn. The bridge will be 102-ft. span and have 217-ft. approaches. There were nine other bids. Chas. Eygabroad, County Auditor.

ALAMEDA, CAL.—The Southern Pacific, according to report, proposes to build a bridge (probably a drawbridge) across the tidal canal near the bridge now being built at Fruitvale Ave.

ALLENTOWN, PA.—The viewers appointed to consider the projected bridge over the Lehigh River have reported in favor of a new bridge, submitting two estimates, one $133,000 for a bridge with a plank roadbed, and the other $160,000 for a bridge with concrete roadbed.

AUBURN, N. Y.—D. F. Austin, City Engineer, informs us that the bridge proposed on Lizette St., over the Owasco Outlet, will probably be of two spans of 100 ft. each and built of steel upon the old substructure. If it is decided to have a stone bridge, it will be of four arches of 45 ft. each.

AUGUSTA, ME.—The New Jersey Steel & Iron Co. has been awarded contracts for two bridges for the city of Augusta, one to be a 40-ft. plate girder highway bridge, with an 18-ft. roadway at Bond Brook, and the other to be a 48-ft. lattice truss bridge, with a roadway of 16 ft., at Coombs Mill.

BOISE, IDA.—It has been voted to issue $15,000 of bonds for the proposed bridge over the Boise River at Government Island. (March 16, p. 175.)

BUFFALO, N. Y.—Plans have been approved by the Grade Crossing Commission for a viaduct over the Western New York & Pennsylvania tracks in Babcock St. It will be 1,000 ft. long. Bids will soon be wanted.

The New York Central will build subways under its tracks at the North Division, Eagle, Emslie and Howard Sts. and Fillmore Ave. during the coming summer.

Erastus C. Knight, City Comptroller, is selling $45,-799 of grade crossing bonds for the city of Buffalo.

CAPE GIRARDEAU, MO.—A bill is now before Congress authorizing the Southern Missouri & Arkansas Railroad & Bridge Co. to build a bridge over the Mississippi River between Cape Girardeau and Grays Point for the Illinois Central, the Chicago & Eastern Illinois, St. Louis Southwestern and other roads. Newman Erb, 66 Broadway, New York City, is President. (March 30, p. 207.)

CARDINGTON, O.—It is stated that C. D. Smiley, County Auditor, is receiving bids for a steel bridge over Whetstone Creek.

CHICAGO, ILL.—Work on the new masonry viaduct to be built by the Pennsylvania at Randolph St. will be begun as soon as the weather permits. The plans have been prepared by the City Fridge Engineer and the structure will be built under his supervision, but the railroad company will pay the $30,000, the estimated cost. (Feb. 2, p. 77.)

The contract held by the Scherzer Roller Lift Bridge Co. for a lift bridge over the main drainage canal has been assigned to the A. & P. Roberts Co. (Feb. 23, p. 126.)

Attorney Gilbert, of the Board of Trustees of the Chicago Sanitary District, has submitted an opinion holding that the Board may spend money for new bridges if they are necessary to provide the required flow of water. On April 9 the Board passed an order by a vote of 5 to 3 calling for the building of three bascule bridges over the Chicago River. The City Engineer recommends that these structures be built at Randolph, Harrison and Eighteenth Sts., where they are most needed. The plan contemplates removing the Washington St. bridge and closing that street at the river until after the tunnel is lowered. The Board also decided to ask the railroads having center pier bridges to substitute bascule bridges for them.

CLARKTON, VA.—E. R. Monroe of Cole's Ferry, Va., wants estimates on an iron roadway bridge 400 ft. long, of two spans 200 ft. each, to be built over the Stanton River at this place.

COHOES, N. Y.—The State Railroad Commissioners have decided that the grade crossing at High St. shall be carried under the tracks of the Troy & Schenectady branch of the New York Central & Hudson River. (March 23, p. 191.)

COLUMBUS, O.—Proposals will be received at the County Auditor's office until April 28 for an arch culvert over Dean run on the Granville road (E. Broad St.) in Jefferson Township. W. H. Halliday, County Auditor.

COLUMBUS, TEX.—The high water in the Colorado River April 12 destroyed the Southern Pacific RR. bridge at this place.

DAVISVILLE, CAL.—Plans and specifications for a bridge over Putah Creek at the Stevenson site near Davisville are being made, to be submitted to the Board of Supervisors May 10. W. O. Russell, County Surveyor.

DECATUR, IND.—Bids are wanted by the Board of Commissioners of Adams County until 10 a. m., May 8, for six steel bridges of one span each, of the following lengths: 80, 40, 35, 26, 24 and 20 ft., all 16-ft. roadway and to set on masonry. W. E. Fulk, County Engineer.

DULUTH, MINN.—Plans have been approved, according to report, for a steel bridge 500 ft. long over the St. Paul & Duluth tracks at Tenth Ave., West.

FITCHBURG, MASS.—An iron viaduct is proposed by the city over the Fitchburg and the New York, New Haven & Hartford railroad tracks and the Nashua River from Fifth to Harvard Sts., at a cost of about $65,000. The bridge will be about 650 ft. long. David A. Hartwell, City Engineer.

FORT MILL, S. C.—T. G. Culp, County Surveyor, Yorkville, S. C., will receive bids until April 24 for a bridge of three spans, 115 ft. each, at Sutton's Ferry, across the Catawba River.

FULTON, N. Y.—It is stated that bids will soon be wanted for the proposed bridge 1,000 ft. long over the Oswego River. The cost is placed at $102,-000.

HAMILTON, O.—Butler County is to offer $11,000 of bridge bonds for sale on May 1.

INDIANAPOLIS, IND.—Reports state that the Chicago, Indianapolis & Louisville will replace all bridges on the main line and the Indianapolis Division with new steel bridges.

JACKSON, MISS.—City Engineer Walter G. Kirkpatrick is receiving bids for four steel bridges. The estimated weight of the steel is 10 tons for each of the four bridges. Contracts for the masonry work have already been let. Bonds to cover the cost were recently sold.

The House of Representatives has passed the bill for a bridge across Pearl River at Jackson.

KENOVA, W. VA.—A bill is before Congress authorizing the Ohio Valley Electric Ry. to build a bridge over the Big Sandy River from Kenova, Wayne County, W. Va., to Catlettsburg, O.

MAUCH CHUNK, PA.—Viewers have been appointed on a county bridge over Poco Creek in Upper Towamensing for Carbon County.

MIDDLETOWN, O.—Bids are wanted May 15, according to report, for the bridge across Tytus Ave., which is to cost $11,000. Bridge bonds are to be sold.

NEW BLOOMFIELD, PA.—Viewers have been appointed on a new county bridge in Wheatfield Township.

The Grand Jury has recommended a bridge built in New Buffalo, Perry County. James Rhinesmith, County Commissioner.

NEW YORK, N. Y.—The bill recently passed by the Legislature and now before the Mayor of New York, regarding the 145th Street bridge over the Harlem River, increases the aprpopriation from $1,-250,000 to $1,750,000 and authorizes the Commissioner of Bridges, subject to approval, to prepare amended plans to widen the bridge from not more than 70 ft. to not more than 90 ft. The act of Legislature authorizing this bridge was passed in 1895 and the contract for building was let in December, 1897, to Messrs. O'Brien, Sheehan & McBean, of New York, on plans and specifications drawn by Messrs. Clinton & Russell, architects, and Prof. W. H. Burr, Consulting Engineer. Owing to lack of funds caused by the uncertain condition prevailing at the time as to the constitutional limit and objections to such plans by the Department of Bridges, no work has been done. The contract has been assigned to John C. Rodgers, by O'Brien, Sheehan & McBean. The amended plans will be made by the Department of Bridges. The bridge was originally intended to extend from Lenox Ave. and 145th St. in Manhattan to Gerard Ave. and 149th St. in the Bronx. The northerly approach in the amended plans will be shortened so as to end at River Ave. The total length of bridge and approaches under original plans is 1,950 ft. Under amended plans it will be 1,590 ft. The cost of the structure as originally designed, estimated on the contract prices, was $1,001,989.90, exclusive of land. The cost under the amended plans has not been definitely estimated.

Plans and specifications for the approaches for the new East River bridge in the boroughs of Manhattan and Brooklyn will be ready for inspection after April 23, at the office of the Chief Engineer, 84 Broadway, Borough of Brooklyn. The date for opening bids will be decided later, as noted in our advertising columns. John W. Weber, Commissioner and Acting Secretary.

NORTHAMPTON, MASS.—Bids for the bridge across the Connecticut River for the Northampton & Amherst Street Ry., were opened April 14. The contract will probably be let this week. The bridge is to be 1,258 ft. long.

OTTAWA, ONT.—We are told that the contract for the masonry work for the Maria St. bridge over the Rideau Canal has been let to John Burns of Ottawa. (March 16, p. 176.) A contract for the superstructure is yet to be let.

PHILADELPHIA, PA.—An ordinance is before the Council appropriating $100,000 for a bridge over the Schuylkill River at Passyunk Ave.

The Director of Public Works has let contracts to the Hoffman Engineering & Construction Co. of Philadelphia for the two bridges on the line of Rhawn St., over Pennypack Creek. (April 12, p. 243.)

QUEBEC, QUE.—Terms of a contract for the bridge proposed by the Quebec Bridge Co. have been practically agreed to with the Phoenix Bridge Co. for the superstructure, and with Wm. Davis & Sons of Cardinal, Ont., for the foundations of the bridge, which is to span the St. Lawrence River nine miles above Quebec.

SANTA CRUZ, CAL.—A bridge is proposed across the Lorenzo River between Santa Cruz and Seabright.

SPRINGFIELD, ILL.—Frank H. Hamilton, City Engineer, informs us that the viaduct proposed across the Wabash RR. at Tenth and Cook Sts. will be an iron girder 66 ft. long. Plans and specifications are now being made.

SOMERVILLE, MASS.—A committee has been appointed to consider a bridge across the Mystic River between Somerville and Medford. No plans or appropriation have been made.

STOCKTON, CAL.—We are told that should the bond issue in contemplation in the City Council be carried, there will be two steel bridges built, each 60 ft. long and 80 ft. wide, each to cost about $6,000. (Feb. 16, p. 110.)

SYDNEY, CAPE BRETON ISLAND.—We are told that the Dominion Iron & Steel Co. has no intention of building a steel bridge across the Sydney Harbor, as recently reported.

TERRE HAUTE, IND.—The Big Four is receiving bids for a new span for the bridge across the Wabash River. (March 2, p. 143.)

WACO, TEX.—Bids will be received May 5 for a 300-ft. steel bridge over the Brazos River. It is to be 60 ft. wide with two sidewalks and will permit of an electric railroad in the center of the roadway. Andrew Goddard may be addressed.

WARE, MASS.—According to the decree of the Railroad Commissioners, this city will have two overhead crossings on Knox Ave.

WASHINGTON, D. C.—The Baltimore & Potomac RR. bill for two bridges across the Potomac River in connection with the plans for abolishing grade crossings in Washington has been reported to the Senate. The proposed passenger bridge is not to cost more than $586,000 and is to be built at a point not less than 500 ft. above the site of the present Long Bridge and is to be of steel.

The design of William H. Burr of New York for the Memorial Bridge across the Potomac River, from the Naval Observatory grounds to Arlington Cemetery, have been accepted by the Secretary of War.

WATERVLIET, N. Y.—The Governer has signed the bill aprpopriating $15,000 for the canal bridge at Twenty-third St. in Watervliet.

WILKESBARRE, PA.—The Grand Jury has recommended that the Wilkesbarre & Wyoming Valley Traction Co. build a new bridge over Mill Creek at Brookside.

WINNIPEG, MAN.—The Canadian Pacific on April 7 let contracts to John Gunn of Stonewall, Man., for masonry work during the season on the bridges on the Western Division, mentioned April 6, p. 226.

WYANET, ILL.—The following are the bids received April 10 for the superstructure of a double-track bridge across the Illinois and Mississippi Canal near Wyanet:

Kink Bridge Co., Cleveland, O.	$20,097
Toledo Bridge Co., Toledo, O.	20,143
Lossig Bridge & Iron Works, Chicago, Ill.	19,265
Carnegie Steel Co., for steel only	20,025
J. G. Wagner Co., Milwaukee, Wis.	19,830
Youngstown Bridge Co., Youngstown, O.	21,033
Massillon Bridge Co., Massillon, O.	20.055
Chicago Bridge & Iron Works,, Chicago, Ill.	*18,387

(*Rejected.)
(April 6, p. 226.)

YONKERS, N. Y.—The Governor has signed the bill authorizing Yonkers to spend $25,000 additional for bridges.

YORK, PA.—The County Commissioners have let a contract to the Wrought Iron Bridge Co. of Canton, O., for rebuilding the bridge across Corduras Creek on College Ave.

Other Structures.

BINGHAMTON, N. Y.—The new D. L. & W. depot will be built this year on the corner of Chenango and Lewis Sts. The roundhouse will be moved. (March 9, p. 159.)

CHICAGO, ILL.—Wm. B. Scaife & Sons, Pittsburgh, Pa., have the contracts for the new buildings for the Iroquois Iron Co. of South Chicago, which include steel tanks and bins besides structural steel.

CORRY, PA.—Plans are now being made to remodel the Erie RR. passenger station at this place.

DECATUR, ILL.—The passenger station which the Wabash RR. will build at this place is estimated to cost $80,000. It will be 230 ft. long. Plans have been made, according to report.

FOND DU LAC, WIS.—The machine and locomotive shop of the Wisconsin Central, for which contracts are yet to be let, will be 507 x 128 ft. (Feb. 9, p. 93.)

FORT WORTH, TEX.—The Atchison, Topeka & Santa Fe expects to spend about $50,000 in a passenger station and rearrangement of yards at Fort Worth, Tex. A new freight depot is also to be built.

GALVESTON, TEX.—The Southern Pacific Co. will enlarge its terminal facilities at this place. The pier capacity will be made to accommodate 18 steamers instead of 12, as at first planned.

GRAND RAPIDS, MICH.—Campbell & McNabb of Grand Rapids have the contract for building the new union station for the Grand Rapids & Indiana in Grand Rapids. The plans were made by Messrs. D. H. Burnham & Co., architects, Chicago, Ill.

JACKSON'S LAKE, ALA.—The Louisville & Nashville will build a new depot at Jackson's Lake.

LEBANON, PA.—Estimates have been asked for the new station for the Philadelphia & Reading at this place. Plans were made by Wilson Bros. & Co. of Philadelphia. It will be 56 x 244 ft., of buff brick, trimmed with light-colored Indiana limestone.

NEW CASTLE, PA.—The capacity of the New Castle Steel Works of the National Steel Co. will be increased to 1,500 tons per day.

NEW YORK, N. Y.—Plans were filed with the Department of Buildings, April 16, by the Manhattan Railway Co., for a three-story electric power house for its new station on the East River front between Seventy-fourth and Seventy-fifth Sts. The building will be of brick and granite and is estimated to cost $750,000. The building will have a steel skeleton and be fireproof.

NEW LONDON, CONN.—It is stated that the Central Vermont has under consideration plans to enlarge its Water St. wharf in connection with the plans to rebuild the freight house recently destroyed.

NORTH ADAMS, MASS.—The James Hunter Machine Co. has received bids on the plans by Lapointe & Bonds for a foundry building in North Adams. It will be 87 ft. x 301 ft., of iron and wood.

PITTSBURGH, PA.—Plans for the enlargement of the Fisher Foundry & Machine Co. have been completed, the additions to cost $75,000.

The North Pittsburgh Foundry Co. has let a contract to the Columbia Bridge Co. for its new plant at West Market and Superior Sts., Allegheny, for $26,000. A specialty will be made of making soil pipe by the continuous casting plan.

ST. LOUIS, MO.—The Scullen-Gallagher Iron & Steel Company's steel plant is nearing completion. The gas house is 48 x 80 ft., and contains six Duff patent gas producers. The furnace department is 65 x 400 ft., and the molding department 75 x 300 ft., each served by independent electric traveling cranes. These departments are inclosed under one roof, having trusses of 140 ft. span, supported by an intermediate post system, set off the center line of the building, the posts also carrying the inner girders for cranes. The building for the finishing of castings is 75 x 300 ft., also provided with electric traveling cranes. The power house is thus far being equipped with two 200 h. p. O'Brien safety water tube boilers, and a St. Louis Corliss engine, 20 x 42 in., will be direct-connected to a 250 kw. Western Electric Co. generator.

SHARON, PA.—The contract for the Sharon Steel Co.'s new office building has been awarded to J. Kratz, of Lima, O.

SPRINGFIELD, ILL.—The plans for the Chicago & Alton freight depot at this place have been made. It will be 252 x 38 ft.

WHITE RIVER, ONT.—The Canadian Pacific roundhouse and five locomotives were destroyed by fire April 11.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

New York Railroad Club.

The subject of discussion at the meeting on Thursday of this week was "Passenger and Freight Car Trucks, Their Principles and Design."

American Society of Civil Engineers.

At the meeting of the Society, held on Wednesday of this week, a paper by Mr. Geo. W. Rafter, entitled "On the Flow of Water Over Dams," was presented for discussion. This paper was printed in the March number of the proceedings.

Franklin Institute.

At the stated meeting of the Society on Wednesday evening of this week a paper on "Recent Progress in the Aluminum Industries" was presented by Dr. Joseph W. Richards of Lehigh University, Bethlehem, Pa. At the meeting of the Mechanical and Engineering section to be held Thursday, May 10, the paper of the evening will be "Expanded Metal and Its Applications," by Mr. James E. Merritt.

Engineers' Club of Philadelphia.

A regular meeting of the Club will be held on Saturday of this week at 8 o'clock p. m. The paper for the evening is "Coal Tar and Coal Tar Products," illustrated, by Mr. Henry Leffmann.

At a meeting of the Society on April 7 a resolution was adopted asking the city officers to continue the work of securing information regarding the available water supply for Philadelphia. Mr. Harrison Souder read a paper at this meeting on the drainage and protection of the Philadelphia lowlands. Mr. L. Y. Schermerhorn followed with a written communication on this subject.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. T. F. Doyle, who recently resigned as Superintendent of the Pine Bluff & Western, has been appointed General Superintendent of the Haywood Timber Company, with headquarters at Little, Ark.

—Col. Jose R. Villalon, M. Am. Soc. C. E., is Secretary of Public Works in the Military Government of Cuba, stationed at Havana. He sailed April 10 for Santiago to be married and will return to Havana about the middle of May.

—Mr. S. A. Wood, an engineer in the employ of the Keystone Bridge Company, died at Pittsburgh on the 9th. He had been with the Keystone Company 10 years and before that had been employed on the Pittsburgh, Cincinnati, Chicago & St. Louis RR., with the Illinois Steel Co., etc.

—Mr. Dankmar Adler died in Chicago last Monday. Mr. Adler's name is known to our readers as the architect of the Transportation Building at the Chicago World's Fair, of the Auditorium Hotel and Stock Exchange in Chicago and of many other remarkable buildings. He was born in Germany in 1844 and came to America with his parents when he was about 10 years old.

—Mr. Willard B. Roberts, a mechanical engineer, died in Chicago April 8. Mr. Roberts' former home was in Hartford, Conn. At different times he had been connected with Fraser & Chalmers and the Q & C Co., of Chicago, and for years he was in the employ of the Great Northern in Montana. At the time of his death he was connected with an Alaskan dredging company. Mr. Roberts was a member of the American Society of Mechanical Engineers.

—Mr. William Jay Holmes, Superintendent of Telegraph at New York of the Erie Railroad, died March 11, at his home in Paterson, N. J. He was born in Auriesville, N. Y., in 1838. He began his railroad career in 1856 as telegraph operator on the New York & Erie and in 1866 became Superintendent of Telegraph of the New York, Lake Erie & Western, now the Erie. His whole life was spent on one road, a remarkable circumstance in our country. He was much esteemed and respected by the officers and employes of the company.

—Mr. Charles E. Smith died in Philadelphia last Sunday in his 80th year. He was President of the Philadelphia & Reading Railroad from 1861 to 1869. He began work in the very early days of railroads, having been one of the engineers on the surveys of the Tioga Railroad and later its Superintendent. He was also a pioneer in iron and steel making, having built the Fairmount Rolling Mill in 1884 and having been connected with the Rensselaer Iron Works at Troy. He was one of the organizers of the American Iron Association, now the American Iron & Steel Association.

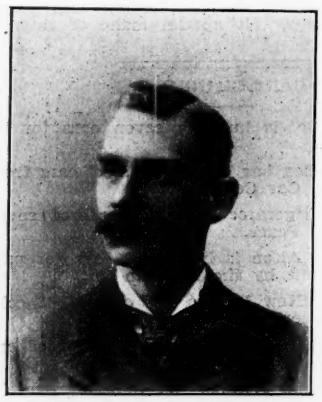
—Mr. James H. Hustis, the new Superintendent of the Harlem Division of the New York Central & Hudson River, was born in New York City Jan. 11, 1864. His entire railroad work has been with the New York Central. He began railroad work in July, 1878, as office boy under Mr. John M. Toucey, late General Manager but then Superintendent of the Hudson and Harlem divisions. After serving in subordinate positions in that office and in the accounting department, he was appointed Trainmaster of the Harlem Division on May 20, 1891. He was advanced to Assistant Superintendent on Nov. 1, 1893, and to his present position of Superintendent on April 1.

—Mr. W. B. Gaskins, the new Superintendent of Motive Power and Machinery of the Pecos Valley & Northeastern, was born in Erie, Pa., May 14, 1868. He entered the machine shops of the Wabash in 1882, and after spending eight years there, entered the employ of the Fort Worth & Denver City as a machinist at Fort Worth, Tex. After spending several months in the shops, he went on the road as fireman and put in about seven years in road service. He was appointed roundhouse foreman at Wichita Falls in September, 1897, and was made general foreman at the main shops in Fort Worth in July, 1898. He entered his present position with the Pecos Valley & Northeastern March 21, 1900.

—Notice has been made in these columns of the resignation of Colonel Samuel B. Dick as Chairman of the Board of Directors of the Pittsburgh, Bessemer & Lake Erie. Colonel Dick was born in Meadville, Pa., Oct. 26, 1836. During his early life he was engaged in banking up to the time of the Civil War. He entered the army in April, 1861, and served about two and a half years in the Army of the Potomac, with advancement from captaincy to colonel. He did not assume active duties in the management of railroads until about 1885, when he was made President of the Pittsburgh, Butler & Shenango, which in 1890 was consolidated with the Pittsburgh, Shenango & Lake Erie. Under his administration the line was finished north from Greenville to Erie, Pa., and also to Conneaut, O., the location of the great ore and coal docks. He remained President of the organization until February, 1897, when these roads having been incorporated into the Pittsburgh, Bessemer & Lake Erie, he was made Chairman of the Board of Directors of that road. Having sold his interests to the Carnegie Company, he retired from the Chairmanship on April 3. Colonel Dick was a member of the Forty-sixth Congress.

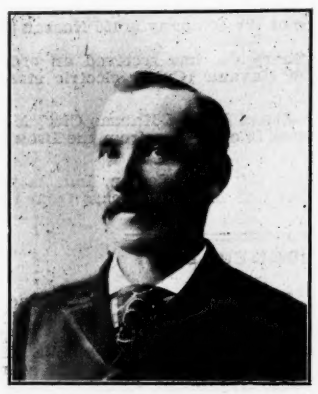
—Mr. C. M. Ingersoll, Jr., as already noted, becomes Chief Engineer of the New York, New Haven & Hartford on May 1. He was born in New Haven, Conn., in 1858, and was graduated at Yale Scientific School in 1880. Shortly after he entered the employ of the Missouri Pacific in the Motive Power Department, but two years later left on account of ill health and entered the employ of his present company, the New York, New Haven & Hartford, in the Engineering Department. There for four years he occupied various positions from chainman to Division Engineer. For six years following 1886 he was in charge of double tracking the Shore Line Division. He then resigned to accept appointment as City Engineer of New Haven, Conn. While in the city's employ he was appointed by the Governor a member of the Board of Harbor Commissioners for New Haven Harbor and was elected President of that Board. In 1893 he returned to the New York, New Haven & Hartford to take charge of the four-tracking of the New York Division between New Haven and the Housatonic River, as assistant engineer in charge of construction. That work nearing completion, he was transferred in November, 1894, to Boston to take charge of the elevation and four-tracking of the Providence Division in the suburban district of that city. When no longer needed there, on Jan. 1, 1897, was appointed Assistant to the President, with headquarters at Boston, the position which he still holds. Mr. Ingersoll is a member of the American Society of Civil Engineers.

—Mr. G. H. Kimball, the new Chief Engineer of the Père Marquette, was born at Newburyport, Mass., Dec. 8, 1849. He was graduated from the Massachusetts Institute of Technology in 1873.



After two years in engineering and surveying, he entered the Motive Power Department of the Pittsburg, Cincinnati, Chicago & St. Louis as a draughtsman in September, 1875. In April the the following year he was made Superintendent of Bridges and Buildings with the same company. He was Superintendent of the Columbus & Sunday Creek Valley, now part of the Toledo & Ohio Central, from Oct. 1, 1879, to Jan. 19, 1880, and then returned to the Pittsburgh, Cincinnati, Chicago & St. Louis as Engineer Maintenance of Way. A year later he was appointed Chief Engineer of the Southeastern extension of the Toledo, Delphos & Burlington. From Oct. 14, 1882, to Jan. 1, 1889, he was Superintendent of the First and Second districts of the New York, Chicago & St. Louis. He was made Chief Engineer of the Lake Shore & Michigan Southern on Feb. 19, 1889, and Consulting Engineer of the same company July, 1891. He continued in this position until September, 1898, when he was appointed Superintendent and Chief Engineer of the Columbus, Sandusky & Hocking. He assumed his present position on March 26.

—From district messenger boy to the General Managership of a great railroad system is a summary of the history of Mr. Wm. B. Doddridge, whose resignation as General Manager of the Missouri Pacific was recently noted in these columns. Mr. Doddridge was



born in Circleville, O., about 48 years ago and was educated in the common schools of Columbus, O. When 14 years of age he began work as a messenger boy in the Western Union Telegraph office at Columbus. After a year, having become a fairly good operator, he was appointed an assistant to the office manager of the Western Union at Zanesville, O. Soon after he went West and got the position of local agent at Columbus, Neb., on the Union Pacific, then building. In 1878 he was made Division Superintendent of the Western Section of the same road, and three years later General Superintendent of the Idaho Division. From his headquarters at Ogden, Utah, he directed much of the building of the Oregon Short Line and the Utah & Northern. In 1884 he resigned his position and for two years was in private business. Then he became Superintendent of the Central Branch Union Pacific at Atchison, Kan., a property controlled by the Missouri Pacific. Soon after his jurisdiction was extended over the Western Division of the parent company. In 1889 he was made General Manager of the St. Louis, Arkansas & Texas, now part of the St. Louis Southwestern. When George J. Gould became President of the Missouri Pacific in 1893, he appointed Mr. Doddridge General Manager of the entire system. Mr. Doddridge intends to take a rest at his home in St. Louis and later will keep his eyes open for an acceptable railroad position.

ELECTIONS AND APPOINTMENTS.

Ashland & Wooster.—A. E. Miller has been appointed General Manager, with headquarters at Ashland, O.

Central of Georgia.—J. F. Hanson was on April 9 elected Chairman of the Board. T. F. Smith was elected Assistant Secretary.

Chattanooga Southern.—A. W. Lefeber has been appointed General Passenger Agent, with headquarters at Chattanooga, Tenn.

Chicago & Eastern Illinois.—A. M. Smith has been appointed Assistant Auditor, with headquarters at 355 Dearborn St., Chicago, Ill.

Chicago, Burlington & Quincy.—C. Sheahan has been appointed Superintendent of Bridges, with headquarters at Galesburg, Ill., succeeding E. C. Olin, resigned.

Coronado Beach.—G. L. Fitzhugh has been elected Secretary and Treasurer, succeeding E. Breitenstein, resigned.

Davenport, Rock Island & Northwestern.—W. T. Finley has been appointed Chief Engineer, succeeding C. E. Dearborn, resigned.

Erie.—F. L. Blendinger has been appointed Superintendent of Telegraph, with headquarters at 26 Cortlandt St., New York, of the Erie, the Chicago & Erie and the New Jersey & New York, succeeding W. J. Holmes, deceased.

Georgetown & Western.—J. K. Ritz has been appointed Superintendent, with headquarters at Georgetown, S. C.

Georgia & Alabama.—B. R. Guest, Treasurer at Savannah, Ga., has resigned.

Gulf, Louisiana & Northern.—The officers of this company are: President and General Manager, Joseph J. Waitz; Vice-President, J. Self; Secretary, C. F. Rock; Treasurer, H. D. Branch, and Auditor, W. A. Evans. (See RR. Construction column, April 21, 1899, p. 289.)

Illinois Central.—M. S. Curley has been appointed Master Mechanic of the Memphis Shops, with jurisdiction over the affairs of the Machinery Department of Grenada District of the Memphis Division, and of the Memphis Terminals, with headquarters at Memphis, Tenn., succeeding W. White, resigned. T. F. Barton succeeds Mr. Curley as Master Mechanic of the Paducas Shops, with jurisdiction over the affairs of the Machinery Department on the Louisville Division and Fulton District of the Memphis Division, with headquarters at Paducah, Ky. J. G. Neudorfer succeeds Mr. Barton as Master Mechanic of the Mississippi and Aberdeen Division, with headquarters at Water Valley, Miss. Effective April 15.

Lockport & Olcott.—The officers of this newly incorporated company are: President, Henry J. Pierce, Buffalo; Vice-President, F. N. Trevor, Lockport, and Secretary and Treasurer, Richard F. Rankine, Niagara Falls. (See RR. Construction column, April 13, p. 246.)

Nevada County Narrow Gage.—E. M. Preston has been elected Treasurer. John Glasson has been elected a Director.

Northern Pacific.—Robert Bacon has been elected a Director, succeeding C. H. Coster, deceased.

Ohio & Little Kanawha.—Alex. Laird has been appointed Master Mechanic, with headquarters at Fair Oaks, O.

Pacific & Idaho Northern.—Garrett O'Neill has been appointed Superintendent, with headquarters at Weiser, Ida.

Pecos Valley & Northeastern.—A. A. Driggs has been appointed Superintendent of the Pecos River Railroad, with headquarters at Pecos, Tex., succeeding J. E. Bowen, resigned.

Pennsylvania.—At a meeting of the stockholders held April 11, Lincoln Godfrey was elected a Director, succeeding the late B. B. Comegys.

S. P. Hutchinson, whose retirement from the office of Superintendent of the Lewiston Division we noted last week, has not left the service of the Pennsylvania RR., but was on April 1 transferred to New York as Assistant General Agent.

Pennsylvania Company.—T. B. Hamilton, heretofore Engineer Maintenance of Way, Southwest System, at Cincinnati, O., has been transferred to the Northwest System as Engineer Maintenance of Way at Wellsville, O., succeeding W. S. Newhall, resigned.

Philadelphia & Reading.—E. E. Brown has been appointed Electrical Engineer, with headquarters at Reading, Pa. Effective April 16.

Pine Bluff & Western.—T. F. Doyle, Superintendent at Pine Bluff, Ark., has resigned.

St. Louis Southwestern.—S. G. Warner, General Passenger Agent at Tyler, Tex., of the St. Louis Southwestern Ry. of Texas, has resigned.

Southern Pacific Railroad of California (Southern Pacific).—At a meeting of the stockholders held April 11, the following new Directors were elected: J. S. Slauson, I. W. Hellman, A. Hayward and J. K. Wilson.

Tuscaloosa Belt.—F. W. Mennish has been appointed Superintendent, succeeding John T. Cochrane.

Wabash, Chester & Western.—Henry Mason has been appointed Superintendent, with headquarters at Chester, Ill., succeeding C. H. Sharman, resigned.

Waynesboro, Pascagoula & Gulf Coast.—The officers of this company referred to in the Construction column are: President, J. R. S. Pitts; Vice-President, M. M. Evans; Secretary, P. K. Mayers; Treasurer, A. Blumer. The central office is Waynesboro, Miss.

White Pass & Yukon.—The general offices of this company will be located at Skaguay, Alaska.

Wisconsin Central.—F. H. Marsh, heretofore Division Superintendent at Fond du Lac, Wis., has been appointed Assistant General Superintendent, with headquarters at Milwaukee, Wis.

A. R. Horn, heretofore Superintendent of the Northern Division, has been transferred as Superintendent of the Southern Division, succeeding Mr. Marsh, transferred. E. H. Cutter succeeds Mr. Horn as Superintendent of the Northern Division.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALABAMA ROADS.—Gaunt Crebs, H. M. Noel and other capitalists of St. Louis, Mo., are reported to have bought the charter of the old Alabama, Black Band, Iron, Coal & Ry. Co., including 20,000 acres of mineral lands in the Paint Rock Valley, and will build a road from Paint Rock, 35 miles up the valley. Surveys are to be begun at once.

ALEXANDER, CLEVELAND & CHARLESTON.—This company was incorporated in West Virginia April 12, with a capital stock of $1,000,000, to build a railroad from Alexander, on the Baltimore & Ohio, to run southwest about 12 miles to Cleveland and thence to Charleston. S. Griffin of Buckhannon, W. Va., is interested.

ATCHISON, TOPEKA & SANTA FE.—The Supervisors of Salinas, Cal., have endorsed a petition to the Atchison to build a branch road from Fresno west via Hollister, Jan Juan and Salinas to Monterey over the right of way of the old Monterey & Fresno. (M. & F., July 29, 1898, p. 555.)

BARCLAY.—In the annual report dated Feb. 5, the Chief Engineer states that during the year careful and complete surveys have been made from Greenwood, Pa., up the Towanda Creek to Cedar Lodge (Canton) on the Northern Central line of the Pennsylvania, about 21 miles. Options on a large portion of the right of way have been secured and a detailed report covering the proposed extension is in preparation. A preliminary examination has been made toward Binghamton, N. Y., but nothing further done in that direction. (Feb. 10, 1898, p. 107.)

BALTIMORE & OHIO.—Bids are being tabulated for a number of extensive improvements, including the cut-off from Frederick Junction, Md., east about 25 miles to Watersville. (March 30, p. 209.)

Building is to be begun at once, according to report, on the Patterson Creek & Potomac line which is to be a cut-off from Patterson Creek, W. Va., to a point on the Third Division, about six miles long and effecting a saving of four miles. There will be one tunnel about 4,000 ft. long. (March 30, p. 209.)

BAY & COAST.—The company has made a new application for a franchise through the city of San Francisco. The recent application was refused. It is proposed to build from San Francisco south about 100 miles to Santa Cruz. L. H. Barnard of Oakland, Cal., is an incorporator. (March 2, p. 145.)

BIRMINGHAM, SELMA & NEW ORLEANS.—The Mayor of Marion, Ala., has apointed a committee to confer with Colonel F. M. Abbott, the owner of this property, with reference to extending the road to that city. (April 6, p. 227.)

BUFFALO, NIAGARA FALLS & ROCHESTER.—This company was incorporated in New York April 16, with a capital stock of $1,250,000, to build a railroad to be operated by horse, cable, electric or compressed air, from Buffalo and Niagara Falls east to Greece near Rochester, where connection will be made with the Rochester Electric System, in all about 120 miles. The directors are: Allan C. Beach of Watertown, Charles S. Baker, George L. Brown, George Moss, Milton Clark, George A. Brooks, Henry D. Quinby and William C. Gray of Rochester, and William H. Gillette of Charlotte.

CAPE FEAR & NORTHERN.—Another survey is in progress for this proposed extension from Duketon, S. C., to the Cape Fear River near Lillington, N. C. (Feb. 9, p. 95.)

CHICAGO, MILWAUKEE & ST. PAUL.—Reports state that extensive improvements are proposed between Chicago and Portage, Wis., which will shorten the line between Chicago and St. Paul by 24 miles, and that all contracts are to be awarded soon.

The company expects to extend its line from Storm Lake, Ia., north about 35 miles to Spencer, where connection will be made with the branch extension from Spencer to Spirit Lake. Grading is to be begun at once and the extension ready for traffic by Sept. 1.

COLORADO & SOUTHERN.—An officer writes that there is nothing in the report that the company will build a line through the Maxwell land grant. (April 6, p. 227.)

COSHOCTON.—This company was incorporated in Ohio April 10, with a capital stock of $10,000, to build a line from Coshocton to the mines of the Coshocton Coal Co. in Tuscarawas Township, with a line from the company's mines in Clinton Township to a point on the Pittsburgh, Cincinnati, Chicago & St. Louis, all in Coshocton County. The incorporators are: Chas. L. Cassingham, G. W. Cassingham, C. O. Lomberson, W. H. McCabe and W. R. Pomerene of Coshocton.

CUMBERLAND MOUNTAIN.—A company under this title proposes to build a railroad from Rugby Road, Tenn., on the Cincinnati, New Orleans & Texas Pacific, to run southwest about 40 miles to Monterey, on the Tennessee Central. Surveys are completed and it is reported that building will be begun soon. Robert Walton of Rugby, Tenn., is interested.

DAVENPORT, ROCK ISLAND & NORTHWESTERN.—Kenefick & Co., who had a contract on the road built last year, have been awarded the contract to build the extension east from Davenport, Ia., to East Moline, Ill. (March 2, p. 145.)

DELAWARE, LACKAWANNA & WESTERN.—The line between South Orange, N. J., and Millburn is to be straightened, according to report, and a third track laid from South Orange to Summit. Burke Bros. of Scranton, Pa., are said to have the contract.

GOBEL & NEHALEM.—This company was incorporated in Oregon April 11, with a capital stock of $100,000, to build a railroad from a point in Columbia County, Ore., on the Northern Pacific near Gobel, to run south to Oak Branch Creek and thence along the Nehalem River to the Nehalem Bay on the Pacific Ocean. The incorporators are: Thomas Day, R. C. Bell and J. F. Boothe, all of Portland, Ore.

GRAND TRUNK.—A deputation from interested towns has waited upon government officers with reference to a government subsidy for rebuilding the Montreal & Providence line from Farnham, Que., southeast 21 miles through Stanbridge East and Frelieghsburg to the Vermont line. It is believed that the subsidy of $3,200 per mile will be granted.

HARRIMAN & NORTHEASTERN.—A letter from the company states that nothing is definitely decided yet as to the extension from Stevens, Tenn., west about nine miles to Wartburg. (April 6, p. 228.)

ILLINOIS CENTRAL.—Preliminary surveys are in progress for a branch of the Yazoo & Mississippi Valley from Glen Allen, Miss., to run south about 20 miles to Ben Lomond, across the Mississippi River from Lake Providence, La., with which connection would be made by boat.

The company is double-tracking its line, according to report, between Fulton, Ill., and East Cairo.

JANESVILLE & SOUTHEASTERN.—Bids have been received for this proposed line from Janesville, Wis., to run southeast 35 miles to Bloomfield. This is said to be a branch of the Chicago, Milwaukee & St. Paul. (March 9, p. 161.)

JOLIET, NEWARK & WESTERN.—Under this title a company proposes to build a railroad from Joliet, Ill., west about 130 miles via Plainfield, Troy, Newark and Dimmick to Moline. J. K. Thuneman and A. S. Halbert of Newark, Ill., are projectors.

KANSAS & TEXAS SOUTHERN.—This company, incorrectly entered April 6 (p. 228) as the Kansas-Texas, was incorporated in Missouri March 21, with a capital stock of $500,000. It proposes to build from a point on the Excello Branch of the Wabash, to run southwest about 50 miles to a point near Clifton Hill, on the main line of the Wabash. Among the incorporators are W. P. Moore, W. P. Heath, H. W. Hollingsworth, J. J. McDonald and C. H. Tolle, all of St. Louis, Mo.

KANSAS CITY, MEXICO & ORIENT.—The Kansas City & Oklahoma Construction Co., which was recently incorporated in Missouri, is in the interest of the K. C., M. & O. Preliminary surveys have been made for the entire route from Kansas City, Mo., southwest via Topeka and Wichita, Kan., Quanah, Sweetwater and Angelo, Tex., Presidio del Norte, Chihuahua and Guazapares, Mex., to Topolobamco, Mex., on the Gulf of California. Fifty miles is graded in Kansas and 7½ miles of track laid. In Oklahoma 45 miles is graded ready for track. In Texas 60 miles is graded and eight miles of track down. There is 150 miles graded in Mexico. A. J. Titus & Co., of Anthony, Kan., have the contract for grading in Oklahoma. Bids are to be asked for steel for 100 miles within the next 30 days. The Construction Company buys the rolling stock under direction of the railroad officials. A. E. Stillwell is President of the railroad company, and C. M. Atkinson, Secretary, both of Kansas City, Mo. The Chief Engineer of the Construction Company is M. P. Parett of Kansas City, Mo. (March 9, p. 161.) The New York office is 150 Nassau St. (Official.)

KERSEY.—The Warren-Burnham Co., 81 Fulton St., New York, has the contract for building this line from Groll's Station, Pa., on the Pittsburgh, Shawmut & Northern, to run south 14½ miles via Burns and Kersey Runs to Weedville, and thence up Bennett's Branch and Cherry Run. Surveys are completed and grading is to be begun at once. There will be no sub-contracts. The work is light. W. R. Warren, President of the Warren-Scharf Asphalt Paving Co., 81 Fulton St., New York, is President of the Construction Co. (Official.)

LITTLE ROCK NORTHERN.—Locating surveys are in progress for this proposed line from Little Rock, Ark., north 287 miles to Springfield, Mo. Building is to follow as soon as location is completed, in about 90 days. (April 6, p. 228.) Andrew Johnson of Mena, Ark., is Vice-President; S. E. Reaugh is Chief Engineer. (Official.)

LOUISVILLE & NASHVILLE.—A branch line is to be built, according to report, from Pittsburg, Laurel County, Ky., to run east about 25 miles to Manchester, Clay County, to tap rich coal and oil fields.

A proposition is under consideration, according to report, to build a branch from the Livingstone Division to coal mines at Brush Creek, Ky.

MANCHESTER & ONEIDA.—This company was incorporated in Iowa this week, with a capital stock of $75,000, to build a line from Manchester, Ia., on the Illinois Central, to run northeast about six miles to Oneida on the Chicago, Milwaukee & St. Paul and the Chicago Great Western. The principal place of business is Manchester.

MARSHALL, TIMPSON & SABINE PASS.—Surveys are in progress for the proposed extension from Timpson, Tex., southeast about 30 miles to San Augustine. (June 30, 1899, p. 483.)

MARSHALLTOWN & DAKOTA.—This line is to be extended, according to report, from Gowrie, Ia., northwest 22 miles to Rockwell City, to connect with the Fort Dodge & Omaha Division of the Illinois Central. It is stated that the property, when so completed, is to have a close traffic agreement with the Illinois Central. Surveys are to be begun at once, and the line built as soon as right of way can be secured.

MISSISSIPPI ROADS.—F. W. Pettibone, Superintendent of the Kingston Lumber Co., Laurel, Miss., writes that plans have not been fully matured as yet for the proposed railroad. The company will build about 40 miles within the next 18 months, but it is uncertain whether Forrest will be the objective point. (April 6, p. 228.)

MOBILE & OHIO.—J. E. Lacey of Jasper, Ala., has been awarded the contract for the extension of 1½ miles at Blockton, Ala., for coal traffic. (March 30, p. 210.)

NEW RIVER, HOLSTON & WESTERN.—Grading was reported begun on this road late in March. The company was incorporated in Virginia Jan. 15, with a capital stock not to exceed $100,000, to build a railroad from Narrows, Giles County, to run west through the counties of Giles and Bland to a point on the Tennessee or Kentucky line. The incorporators are: W. E. C. Merriman, E. B. Younkin, C. LaRue Munson, Martin Williams and W. S. Price. This is probably the line of the Younkin Lumber Co., of Narrows, Va., noted more than a year ago under Virginia Roads.

NEW YORK CENTRAL & HUDSON RIVER.—James P. Ake of Burnside, Pa., and John C. McAtter of Clearfield, Pa., have been awarded a contract, according to report, for an extension from McGee's Mills, Clearfield County, to run northwest about 14 miles to a point near New Creek, Jefferson County.

NORTHERN PACIFIC.—A contract has been awarded, according to report, to Foley Bros. of St. Paul, for an extension from Casselton, N. D., a few miles west of Fargo, to run southwest about 66 miles to Dickey.

Another contract is to be let soon, according to report, for an extension of the Milnor Branch from Milnor, S. D., west about 25 miles.

OHIO RIVER.—Extensive improvements are reported in progress on this line, including new track laying and reballasting and the reduction of grades between Parkersburg, W. Va., and Wheeling.

OKLAHOMA CITY TERMINAL.—This company has been incorporated in Oklahoma, with a capital stock of $100,000, to build a belt road five miles long in Oklahoma City. The incorporators are: C. G. Jones, Henry Overholser, D. C. Lewis, Edward Overholser and E. E. Brown.

OMAHA & ST. LOUIS.—The receivers have negotiated the loan of $525,000, which is to be expended on improvements between Council Bluffs, Ia., and Pattonsburg. The present 60-lb. rails are to be replaced with 75-lb.

OREGON SOUTHERN.—This company was incorporated in Oregon April 2, to build a railroad

from a point on the Oregon RR. & Navigation near the John Day River, to run southeast about 150 miles up the river to the mouth of Rock Creek and thence to Canyon City to connect with the proposed extension of the Columbia Southern. E. E. Lytle, President of the Columbia Southern, is also President of the new company. J. L. Jamison is Chief Engineer.

PECOS VALLEY & NORTHEASTERN.—An officer writes that the proposition has not yet taken definite shape for an extension from Miller, N. M., to El Paso, Tex. Preliminary surveys are in progress. (March 30, p. 210.)

PENNSYLVANIA.—An officer writes that he does not know anything with reference to a reported branch from Centerhall, Pa., to a tract of timber land in Potter Township. (April 6, p. 228.)

Surveys are reported in progress for a line from Brownsville west to Wheeling, W. Va. It is stated that the surveys are completed to Catta Run, 13 miles, and that building on that section will be begun soon.

PERE MARQUETTE.—An officer writes that nothing is known as to any changes in terminal arrangements at Manistee, Mich., as heretofore reported. (April 6, p. 223.)

READING BELT.—This company has been organized to build the belt line around Reading, Pa., for the Philadelphia & Reading, and it is the intention to begin building as soon as possible. (March 16, p. 178.)

ROCHESTER & LAKE ONTARIO.—This property has been merged with the Rochester & Irondequoit into a company called the Rochester & Suburban. The R. & L. O. is to be reconstructed into an overhead trolley electric road and the company expects to begin operating the same May 1. (April 13, p. 246.)

SACRAMENTO & SAN JOAQUIN VALLEY.—Another survey is being made to carry the line further west. It is projected from Stockton, Cal., north about 45 miles to Sacramento. John Cross of Los Angeles, Cal., is President and Chief Engineer. (Dec. 15, 1899, p. 872.)

ST. LOUIS, OKLAHOMA & SOUTHERN.—This company on March 26 filed a certificate of increase of capital stock in Oklahoma Territory from $3,000,000 to $5,500,000. This proposed road is from Sapulpa, I. T., south and southwest to a point on Red River. The company is building from Sapulpa south. Among the incorporators are: J. G. Beard (Secretary), Shawnee, O. T., and J. H. Atterburg, Litchfield, Ill.

SAN JACINTO & SOUTHERN.—This company was incorporated in Texas April 5, with a capital stock of $50,000, to build a railroad fom San Jacinto, on the Gulf, Colorado & Santa Fe in Montgomery County, to run southwest about 20 miles to Cypress, on the Houston & Texas Central, and from San Jacinto northwest to an intersection with the International & Great Northern, seven miles. The principal office is at San Jacinto. Among the incorporators are: C. M. Campbell, W. C. Campbell and T. T. Campbell of Temple.

SOUTHERN.—Right of way is being obtained, according to report, for the proposed extension from Maryville, Blount County, Tenn., to run southeast about nine miles along Little River to Gamble's Store.

SOUTH ST. PAUL BELT.—Surveys are completed for an extension of this line northwest through West St. Paul to connect with the union station across the river. The road is to parallel the Chicago Great Western in part from South St. Paul and will be 4.7 miles long.

SUMPTER VALLEY.—An officer states that the company intends to build only about 15 miles this year instead of 100 miles, as reported. The extension is to be from Sumpter, Ore., south through Bonanza. David Eccles is President and General Manager; Geo. Romney, Vice-President, and C. W. Nibley, Secretary and Treasurer, all of Ogden, Utah. (March 23, p. 194.)

SUPERIOR, BALSAM LAKE & SOUTHERN.—This company was incorporated in Wisconsin April 14, with a capital stock of $100,000, to build a railroad from Superior south 165 miles via Balsam Lake and through St. Croix County to St. Paul, Minn. The directors are: J. W. Park of Balsam Lake, I. Seery of St. Croix Falls, Louis Sund of Clam Falls, John H. Savage of Eau Claire, M. C. Peterson, W. W. Seery, Warren Tuttle, R. F. Little, and Paul Nelson of Polk County.

UNION PACIFIC.—Cheyenne press reports state that the company has let a contract to Owen Bros. of Fremont, Neb., for double tracking from Cheyenne west to Borie, nine miles, and the new track is to be ready for traffic, it is stated, by the middle of July.

McArthur Bros. of Chicago, and Kilpatrick Bros. & Collins of Lincoln, Neb., have been awarded the contract, according to report, for the cut-off from Buford, 20 miles west of Cheyenne, Wyo., around Sherman Hill to Laramie. It will require a tunnel of 1,500 ft. through the hill. Work is to be begun about May 1. (March 23, p. 194.)

UNIONTOWN, WAYNESBURG & WEST VIRGINIA.—Preliminary surveys are completed for this line from Uniontown, Pa., west 71 miles via Waynesburg, Rogerville and Bristona to Wheeling, W. Va. Reports state that contracts are to be let about June 1. August Jutte of Pittsburgh is President and J. F. Bedell of Putnam, Pa., Chief Engineer. (March 23, p. 194.)

WAYNESBORO, PASCAGOULA & GULF COAST.—Preliminary surveys have been made from Waynesboro, Miss., to Scranton, 107 miles. The road is to pass through Henderson, crossing the Chickasahay River near Waynesboro and again near the junction of Leaf River. It crosses the line of the Mobile, Jackson & Kansas City near Merrill, Miss., and runs thence to Mosspoint and Scranton. Under the charter the southern terminus may be at Gulf Port or at any point between there and the Alabama State line. The proposed route is through a fine virgin yellow pine forest. The prospect for building is good, as the company has money in hand to finance the road and is simply waiting to determine the southern terminus. The officers are given under Elections and Appointments. (Official.)

GENERAL RAILROAD NEWS.

BALTIMORE & OHIO.—With reference to the proposed issue of new common stock, a circular under date of April 11 states that holders of outstanding voting trust certificates for common stock, registered on April 21, may buy at $80 per share new voting trust certificates for common stock to the par value of $6,398,900 at a proportion of one share of new stock to each six held. Subscriptions must be made at the company's office, New York, on or before May 7. The purchase price, $10, is payable on the making of subscription and the balance, $70, on Oct. 1. There are to be no dividends on the new stock for the fiscal year ending June 30, 1900. (April 13, p. 246.)

BOSTON & ALBANY.—A new bill for the lease of this property to the New York Central & Hudson River was offered before the Committee on Railroads April 17. It is understood that the bill is backed by a committee appointed by Mayor Hart of Boston to investigate the proposals of the New York Central. It calls for a separate accounting of the receipts, expenditures and profits of the B. & A., to be submitted to the Board of Railroad Commissioners; that all profits above the amount required to pay dividends of 8 per cent. on the capital stock be applied to improvements; or, if the Board of Railroad Commisioners shall so determine, to reduce fares and freight rates; that $5,000,000 shall be expended five years from July 1, 1900, in improvements of water front terminals in Boston. It provides further that Boston shall be placed in all respects on as favorable a footing as the city of New York in the transportation of freight. It provides for a referendum to the people of the State at the election next November. (March 9, p. 162.)

CANADIAN PACIFIC.—Application has been made to the London Stock Exchange to quote another issue of £1,200,000 of 4 per cent. non-cumulative preferred stock, and £1,213,880 4 per cent. perpetual consolidated debenture stock. The company has now outstanding $26,791,000 of preferred stock.

CENTRAL PACIFIC.—The company has cancelled $1,567,000 of 3½ per cent. bonds in addition to the $938,000 cancelled a few weeks ago. This reduces the amount outstanding to $31,090,000. (Feb. 16, p. 112.)

CHICAGO & ALTON.—An additional 55 per cent. has been called for payment at the company's office, New York, on or before May 7, on the $40,000,000 of new refunding 3 per cent. gold bonds subscribed at 65 in July, 1889, by the stockholders. The first call for 25 per cent. was paid Oct. 10, 1889. The remaining 20 per cent. amounting to $8,000,000 will not be availed of and that portion of the subscription is cancelled. (July 28, 1899, p. 548.)

CHICAGO, BURLINGTON & QUINCY.—In addition to the $2,000,000 of Illinois Division 3½ per cent. bonds recently bought by Lee, Higginson & Co., Boston, the company has exchanged $3,428,000 in retiring consolidated 7's of 1903. The total issue of these bonds is $21,594,000. (Feb. 16, p. 112.)

CHICAGO TERMINAL TRANSFER.—This company has absorbed the Chicago, West Pullman & Southern, which has a short road at West Pullman, Chicago, connecting the Illinois Central, the Pittsburgh, Cincinnati, Chicago & St. Louis and the Chicago, Rock Island & Pacific. The Chicago Terminal Transfer does not reach West Pullman, but it is stated that an extension is to be built at once to that city. For the present the Rock Island is to furnish the connecting link from Blue Island Junction.

CHICAGO UNION TRACTION.—At a meeting of the directors held April 14, the officers were empowered to sign an agreement with the Chicago Consolidated Traction for the consolidation of that company's lines into the Union Traction. These two companies, when consolidated, will include practically all the surface roads of the city.

CUMBERLAND & OHIO.—Justice White of the Supreme Court, Washington, on April 9 handed down a decision holding the Louisville & Nashville liable for the interest on $250,000 of 7 per cent. bonds of the Cumberland & Ohio, Northern Division. The case is of long standing. (Oct. 6, 1899, p. 702.)

DENVER & RIO GRANDE.—The directors have called a special meeting to be held at Denver, Colo., May 15, to vote on a proposed guarantee of $2,277,000 of Rio Grande Southern 4 per cent. first mortgage bonds. The proceeds, it is stated, are to be used for additional rolling stock and for the expenditure incurred last year in standard gaging the road between La Veta and Alamosa.

GULF & BRAZOS VALLEY.—The Texas Railroad Commission on April 6 ordered registered $10,500 of stock of this company on its 10½ miles of completed road. (Jan. 19, p. 48.)

INDIANAPOLIS & VINCENNES.—The $1,400,000 of second mortgage 6 per cent. coupon bonds maturing May 1 will be redeemed by the Pennsylvania Co. at maturity at the office of the Farmers' Loan & Trust Co., New York.

KANSAS MIDLAND.—The St. Louis & San Francisco has made an agreement for the purchase of the line from Wichita to Ellsworth, 106 miles, the consideration being $1,100,000 of Kansas Midland Division first mortgage 4 per cent. bonds, and $965,000 common stock trust certificates of the St. L. & S. F. New St. L. & S. F. bonds are authorized for $1,300,000, interest accruing from April 1, of which $200,000 is reserved for future improvements on the K. M. The new securities will be distributed pro rata to the $1,608,000 outstanding K. M. bonds, less the amount required to pay expenses and about $60,000 receivers' certificates, a reduction of about $200,000.

LOUISVILLE, EVANSVILLE & ST. LOUIS.—J. P. Morgan & Co. announce that a plan of reorganization will be issued, based upon an agreement by the Southern to take over the property after reorganization. Holders of the $2,000,000 first mortgage bonds will receive par value in new 4 per cent. bonds for the principal, and cash for an agreed amount of the interest due on the old bonds. A large proportion of the consolidated 5 per cent. bonds have been bought by interests said to be friendly to the Southern. This property would give the Southern entry into St. Louis.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—August Belmont, Chairman of the Louisville & Nashville, informs shareholders of the N., C. & St. L. that an examination of the affairs of their company shows that for many years dividends have been paid out of funds which should have been devoted to the maintenance and extension of the property. He states that additional expenditures will necessitate a suspension of dividends for at least five years. As the L. & N. has a large interest in the stock, it offers the right to exchange for L. & N. stock on or before July 2 on the basis of two shares of N., C. & St. L. for one share of L. & N.

NASHVILLE, FLORENCE & SHEFFIELD.—This property was sold at public auction at Columbia, Tenn., April 11, to the Louisville & Nashville for $50,000. It was subject to the bonded indebtedness and was sold to satisfy a judgment for about $874,000. The N., F. & S. is controlled by the L. & N. through ownership of stock. (Aug. 25, 1899, p. 604.)

NEW YORK & HARLEM.—Harvey Fisk & Sons, having sold $9,000,000 of the new issue of the New York & Harlem 3½ per cent. gold bonds of May 1, 1900, offer the remaining $3,000,000 at 115.82, which would yield 3 per cent. on the investment. The bonds are deliverable May 1. (April 13, p. 246.)

NORTHERN CENTRAL. — Consolidated general mortgage bonds to the par value of $165,000 have been drawn for payment at the London Joint Stock Bank, Ltd., in London, or at the office of the railroad company in Baltimore on July 1, interest to cease from that date.

PENNSYLVANIA MIDLAND.—Judge Longnecker of Bedford, Pa., on April 16 filed a decree of foreclosure of this property under mortgage foreclosure proceedings. The line runs from Cessna, Pa., through Imler Valley, 12.6 miles, and has been under the receiver since Oct. 24, 1895.

PEORIA, DECATUR & EVANSVILLE.—Judge Allen in the Federal Court at Springfield, Ill., has entered a second order denying the order confirming the sale of this property, the order having been made without notice to the objecting second mortgage bondholders and stockholders. The application will come up again on April 23 when the dissenting mortgage bondholders and stockholders will make their objections. (April 13, p. 246.)

PERE MARQUETTE.—A. M. Kidder & Co., New York, and S. D. Loring & Son, Boston, have bought $1,000,000 4 per cent. 20-year extended first mortgage bonds of the Holly, Wayne & Monroe, the proceeds to be used in retiring a like amount of first mortgage 8 per cent. bonds of the same company, maturing Jan. 1, 1901. This refunding will reduce the fixed charges on these bonds by $40,000. (Dec. 29, 1899, p. 902.)

PULLMAN COMPANY.—Justice Beekman of the Supreme Court has denied the motion of Wm. H. N Francis, a stockholder of the Wagner Palace Car Co, to enjoin the transfer of the stock of that company to the Pullman Company. (Jan. 5, p. 14.)

SEABOARD AIR LINE.—The Maryland Court of Appeals on April 6, at Baltimore, confirmed the decision of the lower court denying the application of Thomas F. Ryan of New York to compel the McLane Committee to issue to him the stock represented by the certificates of deposit which he had bought. (March 23, p. 194.)

SIOUX CITY & PACIFIC.—The House of Representatives at Washington on April 10 passed a bill to create a commission to settle the indebtedness of the S. C. & P. with the United States.

SOUTHWESTERN ARKANSAS & INDIAN TERRITORY.—Judge Williams in the U. S. Circuit Court at Little Rock, Ark., on April 8 directed the Receiver to pay first the receivers' certificates and interest on the same, and all receivers' notes, accounts and current debts, expenses of the court, etc. He was then to pay off the claims of the German National Bank with interest, several minor judgments, and finally the preferred claims without interest. The residue is to be divided pro rata among the other debtors. (March 23, p. 194.)

THIRD AVENUE (NEW YORK CITY).—The property of this company on April 11 was leased to the Metropolitan Street Ry. Co. for 999 years, subject to the approval of the stockholders of both companies who are to meet early in May. By the terms of the proposed lease the Metropolitan agrees to guarantee first the principal and interest on the Third Avenue bonds and then to pay the Third Avenue Co. for the first four years of the lease the net earnings of the system above fixed charges and operating expenses; for the next two years 5 per cent. on the capital stock of $16,000,000, and for the following four years, 6 per cent. After 10 years 7 per cent. is guaranteed. (April 13, p. 246.)

TOLEDO, ST. LOUIS & KANSAS CITY.—Judge Thompson at Toledo, O., on April 17 confirmed the sale of this property made on March 27 at that city to representatives of the bondholders' committee. Prior to this he overruled the petition of Sylvester Kneeland, former President of the road, asking that the sale of the property be set aside on the ground that three directors, Armour, Quigley and Havemeyer, entered into a conspiracy in 1893 to wreck the property and then buy in the securities. (March 30, p. 210.)

UNION DEPOT COMPANY OF KANSAS CITY, MO.—A call has been issued for a stockholders' meeting on April 29, to consider the increase of capital stock from $500,000 to $750,000.

VICKSBURG, SHREVEPORT & PACIFIC.—H. D. Hearns of Illinois has petitioned for a receiver for this property and has asked that the road be enjoined from disposing of any of its lands and from making any change in the present status. Judge Alex. Boarman at Shreveport, La., on April 6 issued a temporary restraining order and the suit is set to be tried at Shreveport May 7. The V., S. & P. forms a part of the Queen & Crescent Route from Delta, La., via Shreveport to the Texas State line, 188.42 miles.